ENGINEERING AND MINING JOURNAL

A McGRAW HILL PUBLICATION

DECEMBER 1950

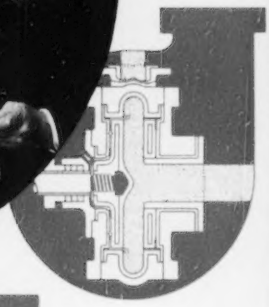
FOUNDED 1866

How Oliver Iron Mining Company's Training Program Works:

- How Carefully It Must Be Supervised.
- How It Helps Young Engineers Get Started.
- Why It Is A Worthwhile Investment For The Future . . . Begins on Page 74.

When the engineers

get together to decide on the equipment for a new preparation or beneficiation plant, there's a good chance that they'll agree on the abrasives-handling pumps, at least. That's why you find Hydroseals all over the mining world today, and that's why these pumps are specified on the blueprints of tomorrow. Engineers don't depend on the calculus of probabilities to tell them what abrasives pumps to use. Instead, when they specify Hydroseals, they think in terms of time-proved advantages.



HIGH EFFICIENCY

Clear sealing water protects the close clearances from abrasive wear. Initial high efficiencies are thus maintained throughout pump life.

MINIMUM DILUTION

Dilution from the Hydrosealing water is only a very small fraction of the water handled by Hydroseal Sand and Dredge Pumps; it is infinitesimal even in the largest Hydroseal Slurry Pumps.

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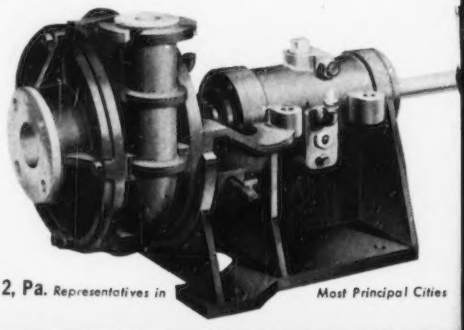
Many Hydroseals have pumped over a million tons of abrasives without new parts or repairs. Abrasives "bounce off" Maximix Rubber parts.

LOW COST

Hydroseal efficiency reduces power cost by 1/3 to 1/2. Maximix Rubber parts last 4 to 6 times as long as equivalent metal parts.



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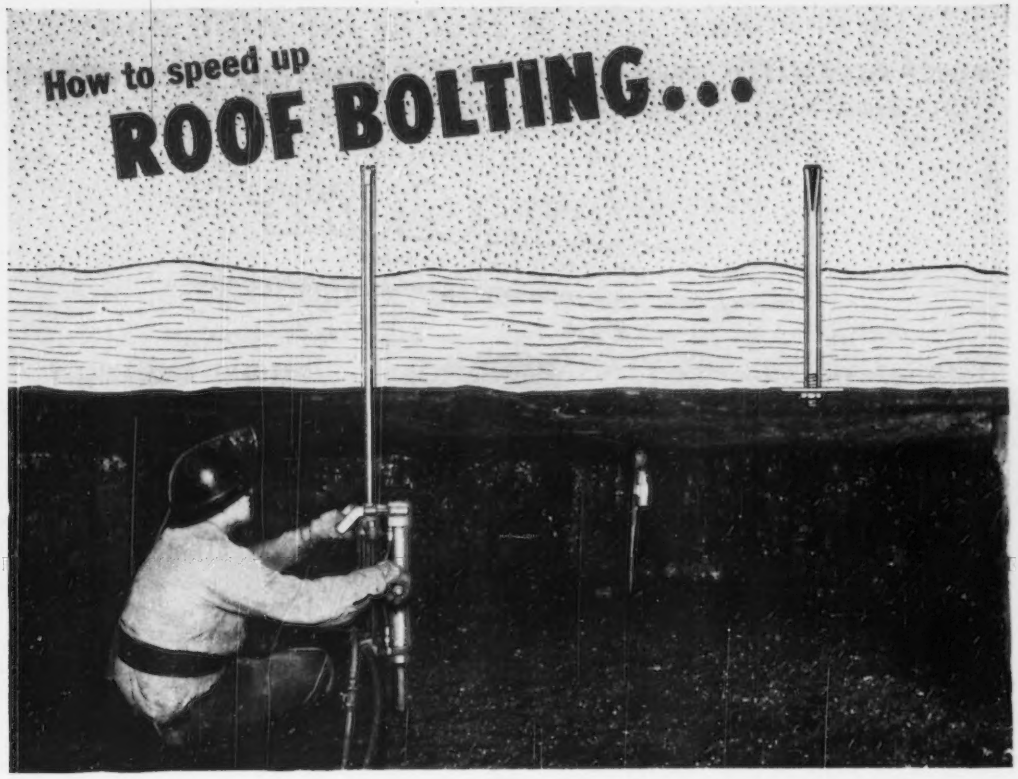
SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

How to speed up ROOF BOLTING...



... with the popular I-R "Big Three" ROOF BOLTING COMBINATION

1 RP 38 "SHORT-LEG" STOPER
more power, less weight

Light in weight, well-balanced, this powerful, ultra-compact RP 38 "Short-Leg" Stoper can be readily handled in seams as low as three feet. It provides automatic rotation for fast, easy drilling of roof holes, and has plenty of power for driving roof bolts.

For extra heavy drilling, use Model RP-48.

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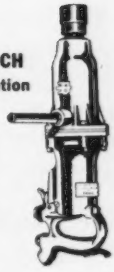
Tightening the nuts in roof bolting is done quickly, easily with the I-R 534 Impact Wrench. This air-operated tool exerts a more powerful turning effect than that of any other portable wrench of this size. Extra deep sockets are available.



3 CARSET JACKBITS
faster drilling, longer life

Widely-used, long-lasting Carset Jackbits, with inserts of tungsten carbide, practically eliminate bit changing and the time loss this means. They stay sharp longer. Increase drilling speed 50% or more.

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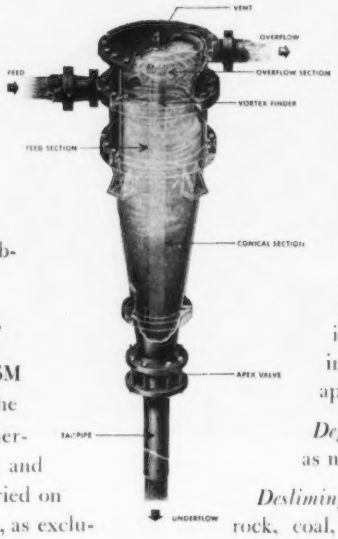
a new and proven tool in metallic and non-metallic minerals and chemical processing

the DORR CLONE*

(DUTCH STATE MINES CYCLONE)

The DorrClone is a compact cylindro-conical classification unit utilizing centrifugal force in place of gravity. It provides a new method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current established practices.



RESEARCH AND DEVELOPMENT

Development of the DorrClone (DSM Cyclone) was begun in 1939 by the Dutch State Mines in The Netherlands, where a continuing research and development program has been carried on since that time. The Dorr Company, as exclusive licensee under the Dutch State Mines patent rights in all fields other than that of heavy media separation, has been actively engaged since 1948 in development work relating to design variables affecting performance, materials of construction and possible fields of commercial use. The result of this program is a carefully engineered unit, capable of controlled and predictable operation.

PRESENT AVAILABILITY

DorrClones are now available singly or in multiple arrangements in four standard sizes: 3″, 6″, 12″ and 24″ diameters.

APPLICATIONS

Standard units are now limited to separations in the 20 micron to 100 mesh range but present studies indicate broader applications in the future. Typical commercial applications proven to date are:

Degritting of viscous suspensions such as milk of lime and clay slurries.

Desliming of metallurgical pulps, phosphate rock, coal, iron ore and tailings for mine backfill, with the production of extremely dense underflows where such are desired.

Classification of crystalline and other granular suspensions.

PATENTS

The DorrClone is covered by patents issued and pending in the United States and other countries.

Further information... We welcome inquiries on specific problems and applications and are prepared to undertake engineering investigations within the scope of our present knowledge and experience.

*DorrClone is a Trademark of The Dorr Company

DORR

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ENGINEERING AND MINING JOURNAL

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When used as recommended, all the oils in the Texaco air compressor series improve performance, assure *clean* compressors and systems, and bring down maintenance costs.

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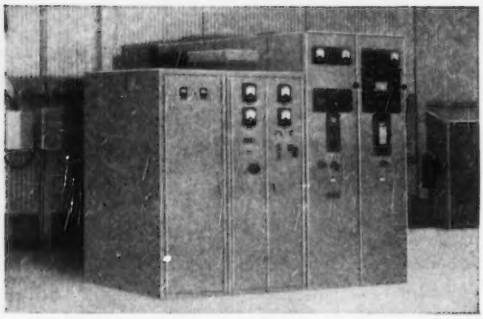
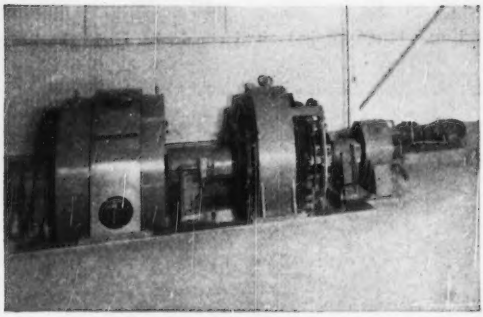
FOR ALL OPERATING CONDITIONS

AUTOMATIC HOISTING for continuous tonnage!



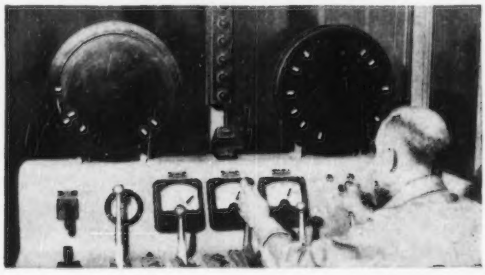
Completely metal-enclosed for personnel safety, this control cubicle houses the synchronous motor switchgear panel, plus Ward Leonard type d-c control equipment. Less space requirement and simplified control result from use of the G-E amplidyne, which eliminates need for many contactors and relays, while permitting the retention of safe limits on the hoist's acceleration and deceleration.



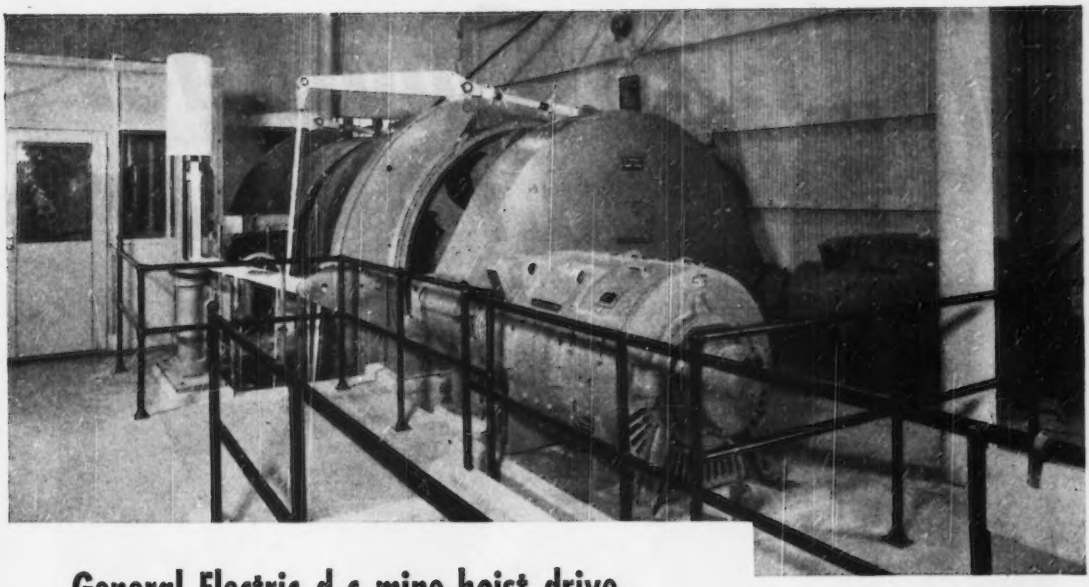
Converting a-c to d-c, this G-E motor-generator set comprises a 750-kw generator, an 1100-hp synchronous motor, and a 20-kw exciter. The generator supplies adjustable-voltage power for the operation of the two hoist motors. At right, the G-E amplidyne, used as an exciter for this generator, provides superior operation and more positive limits of acceleration and deceleration, for greater safety, increased production.

MINE-HOIST DRIVES

—to cut mining costs!



When necessary for inspection, testing, or man-trips, control of the hoist can quickly be switched from automatic to the manually operated master controller as above. Adequate starting, stopping, and maneuvering of the skips with ease, precision, and safety is provided by the optional manual operation. With the normal automatic operation, the duties of the operator may be chiefly of another nature.



This automatic mine hoist is powered by a complete G-E drive that includes two 500-hp d-c motors. When the skip at the shaft bottom is fully loaded, it starts and accelerates to full speed. Near the dumping pocket, it automatically slows down, eases through the dumping horns, and makes a dead stop at the final limit of travel, thus completing the entire cycle automatically.

General Electric d-c mine-hoist drive with amplidyne control permits continuous output at 8 tons per minute, simplifies operation, increases safety, prolongs equipment life!

Here is another General Electric amplidyne-controlled d-c mine hoist drive helping to boost output and cut costs—in this case in a New Mexico potash mine.

This high-speed high-tonnage hoist raises in balance an 8-ton payload every minute up an 1150-foot shaft at speeds up to 1500 fpm. The hoist runs fully automatically throughout the entire shift, and may also be run by push-button control operated by the skip loader at the loading level.

Because it is completely automatic, this continuous, highly efficient operation permits hoisting maximum tonnage per man-hour. Hoist speed is closely maintained in spite of load variations, repetitive operation helps cut costs per ton, and personnel may be freed for other duties. Electric braking provides greater safety and prolongs the life of the hoist mechanism.

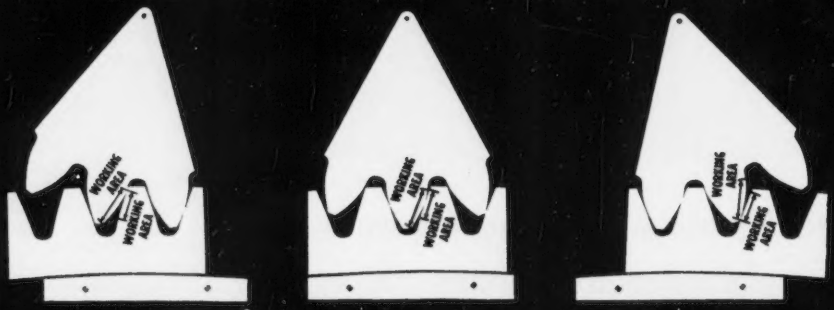
Applicable for any type of mining, this installation is further evidence of G-E experience in engineering automatic mine-hoist drives, experience that dates back to 1915. Let a G-E mining specialist put this experience to work on *your* mine-hoist problems. Call him at your nearest G-E office. Meanwhile, send for Bulletin GET-1430. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

5003-22

NOW! New Smoother Running Gear

LASTS LONGER · CUTS COSTS



Trailing tooth picks up load before preceding tooth loses contact.

There's more area for tooth contact with 20° long addendum tooth.

No gouging when gear tooth pulls away from pinion.

Big news for operators of grinding mills, rotary kilns, coolers, dryers! Allis-Chalmers offers new 20° involute cut tooth spur gear . . . developed after a comparative survey proved these gears the most effective for smooth operation and long gear life.

HERE'S WHY new 20° involute spur gear with long addendum pinion and short addendum gear tooth results in smooth, even distribution of force from pinion to gear:

1) Gear tooth *rolls* evenly on pinion tooth, not first rolling and then sliding. 2) Rolling action results in least friction wear. Pressure is lower because working force is distributed over 75% more tooth area. 3) Each gear tooth is 25% thicker at base, 25% stronger per inch of gear face.

Gear teeth cannot rub on following pinion tooth when it pulls away on turn. Each gear tooth is a true involute shape, cut on precision machines and rigidly inspected to assure large gears of high accuracy.

This improved gear is standard on new A-C equipment; can, in many cases, be obtained to replace existing gears without changing center to center distances. For more facts, call the Allis-Chalmers man in your area.

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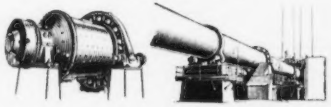

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Also used on rotary dryers, coolers, blade mills, etc.

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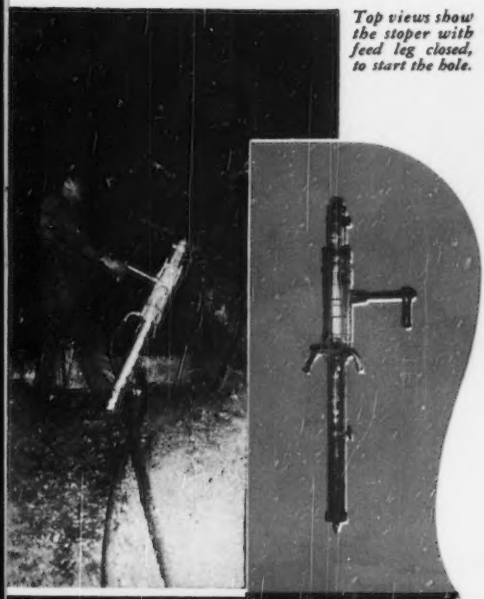

Top views show the stoper with feed leg closed, to start the hole.

JOY S-91T TELESCOPIC FEED STOPER

Bottom views show the S-91T with its telescopic feed leg extended.

Check these Advantages!

FEWER STEEL CHANGES

Now—36" steel changes with the Joy S-91T! In most cases, this eliminates at least one length of steel—cuts your investment in drill steel by 30 to 50%—lets you get full benefit from carbide or other long-wearing bits.

MORE TIME FOR DRILLING

With less time out for changing steel, there's more time for making footage. That means more feet of hole per drilling shift, at lower cost per foot. Less work for your drill operators, too—they'll like and prefer the S-91T.

SHORT LENGTH—LOW WEIGHT

The telescopic feed leg makes possible 36" steel changes while decreasing the overall length of the drill, and without appreciably increasing its weight. Only 52" long, the S-91T is ideal for narrow stopes, starting cross cuts, etc.

EXCLUSIVE DRILLING FEATURES

With "thumb-flip" rotation control for safe, easy spotting of holes—with the famous Joy "Dual Valve" that makes air do more work—the S-91T definitely represents the latest improvement in stoper design. ● Let us *prove* it!

Consult a Joy Engineer

W&D M3384

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Arctic Mine doubles

Sydvaranger, A/S is moving 25 million yards of rock with 12 LeTourneau 40-ton rubber-tired haul units

At Kirkenes, Norway, 215 miles (346 km.) north of the Arctic Circle, approximately 25 million yards of rock (19,000,000 m^3) are to be removed to uncover magnetite ore. Deepest point of excavation in the vast, open-pit mine will be about 350 feet (106 m.) below ground surface. Ultimate production goal is 2.3 million tons of ore annually. This calls for removal of 12,000 tons of rock overburden and iron ore every 24 hours, year-around, in temperatures which range from 86° F. (30° C.) above zero to 31° F. (35° C.) below zero.

To achieve quickly and maintain this heavy production schedule, Sydvaranger, A/S, well-known firm from Oslo, Norway, assigned all hauling to a fleet of 12 LeTourneau big-capacity, rubber-tired Tournarockers. Carrying approximately 40 tons of rock each trip, these giant, rear-dump trucks haul from shovel to crushing plant at high speeds, dumping their loads at a touch of an electric switch. At start of operations, Sydvaranger originally brought in 6 of these modern hauling units, finding their performance so dependable and satisfactory, they added 6 more.

The enterprising Norwegian firm has also modernized pit and haul road maintenance with 2 LeTourneau high-speed Tournadozers (illustrated right). These mobile Bulldozers, rolling on giant tires, travel at speeds up to 19 m.p.h. (30.5 k.p.h.). They built the main haul road from mine to crushing plant, and handle clean-up around all shovels in the pit.

To you, this advanced earthmoving equipment can also mean lower costs and increased production on your mining operations. See your nearest LeTourneau Distributor, or write us direct for complete information on high-speed Tournadozers and rear-dump Tournarockers. In addition to 40-ton size, these revolutionary haul units are also available in 35-ton (31,750 kg.), 16-ton (14,500 kg.) and 9-ton (8,150 kg.) size. Tournarocker prime movers can also be used to power Carryall Scrapers, bottom-dump wagons, cranes, flatbeds, and other auxiliary interchangeable hauled units, thus assuring you of continuous profitable operation. Investigate TODAY.

LET

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COMPANY _____ Dept. or Div. _____

STREET _____

CITY _____ STATE _____

Send us specs., price and performance data on

- ☐ 35 or larger
- ☐ 16 ☐ 9-ton Tournarockers.
- ☐ Also send facts on 180 h.p. rubber-tired Tournadozer.

TOURNAROCKER fleet

Hauls rock—At Kirkenes, all hauling from stripping shovel to crusher was assigned by Sydvaranger, A/S, to their twelve 40-ton Tournarockers.

Handles clean-up—This high-speed Tournadozer is one of 2 in use for shovel clean-up and haul road maintenance in the Norwegian iron mine.

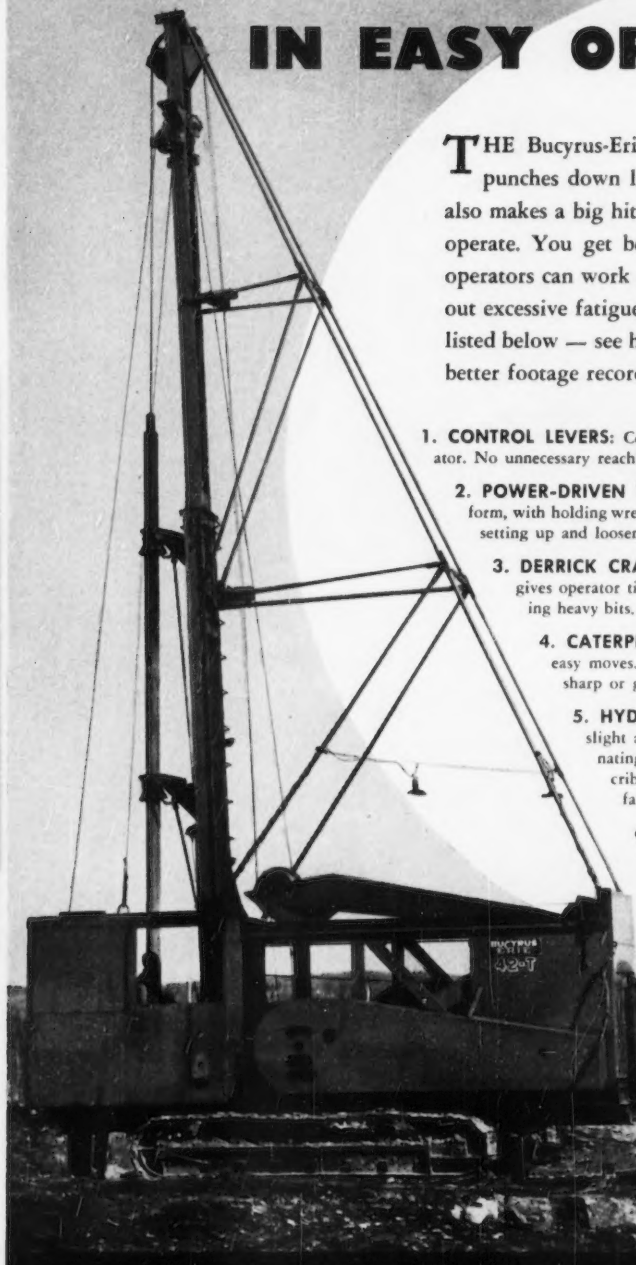
Tournarocker—Trademark Tournadozer, Carryall Trademark Reg. U.S. Pat. Off.

LETOURNEAU TOURNAROCKERS

PEORIA, ILLINOIS

TRACTION ADVANTAGES of A CRAWLER PLUS HIGH-SPEED on RUBBER

THERE'S *Increased Footage* IN EASY OPERATION



THE Bucyrus-Erie 42-T blast hole drill not only punches down large diameter blast holes fast — it also makes a big hit with drillers because it's so easy to operate. You get better hole production because your operators can work at full speed for long periods without excessive fatigue. Check the convenience advantages listed below — see how they can help your drillers make better footage records each shift.

1. **CONTROL LEVERS:** Conveniently grouped within easy reach of operator. No unnecessary reaching or moving.

2. **POWER-DRIVEN TOOL WRENCH:** Located on operator's platform, with holding wrench hinged in lower derrick. Provides means of setting up and loosening tool joints quickly, with minimum effort.

3. **DERRICK CRANE:** With chain block of 1½ ton capacity, gives operator time-saving convenience in handling and changing heavy bits.

4. **CATERPILLAR-TYPE MOUNTING:** For quick and easy moves. Tractor-like steering control permits making sharp or gradual turns for outstanding maneuverability.

5. **HYDRAULIC LEVELING JACKS:** (Optional at slight additional cost). Save leveling time by eliminating elaborate ground preparations, blocking and cribbing. Control valves conveniently located for fast, easy operation.

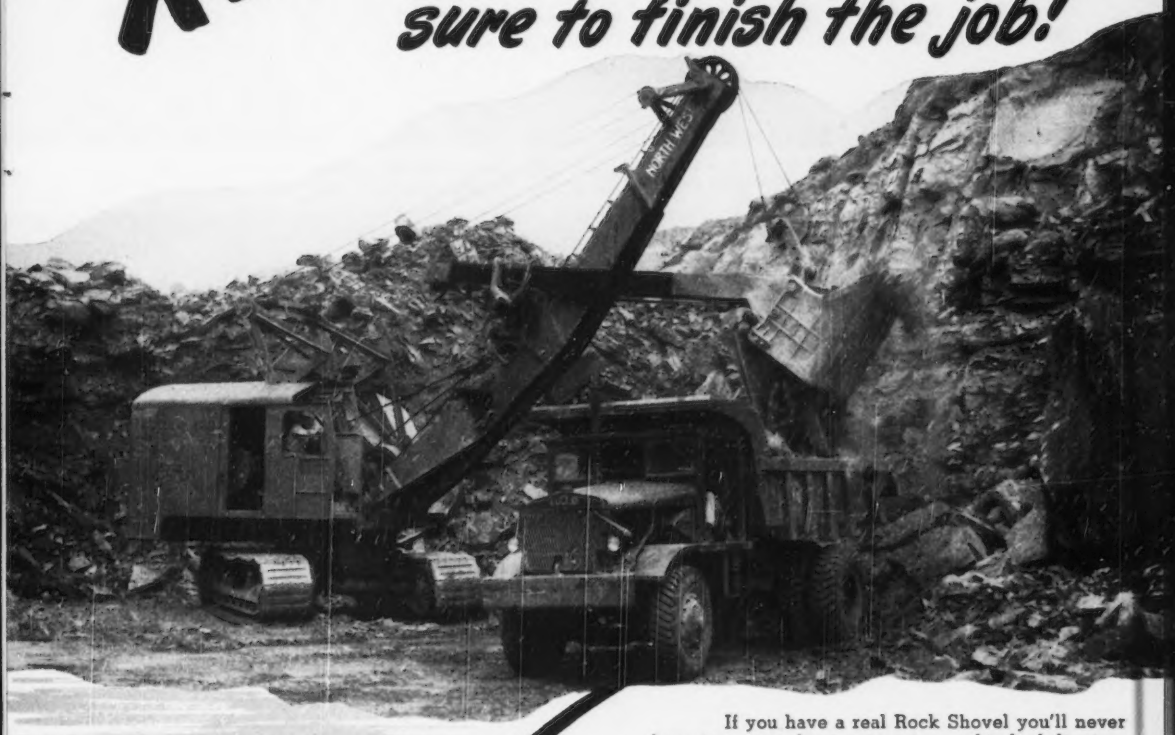
6. **SHEET STEEL OPERATOR'S CAB:** (Optional at slight additional cost). Complete with coal stove, protects operator in severe weather. Has sliding panel window for better vision.

37B50

Add to these efficiency features the 42-T's hard-hitting drilling action and you'll see why many mine operators have achieved substantial reductions in preparation costs. Write for complete information.

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

Start with a REAL ROCK SHOVEL ...and you'll be sure to finish the job!



If you have a real Rock Shovel you'll never have to worry about output in any kind of digging. Start with a real Rock Shovel and you'll be sure to finish the job.

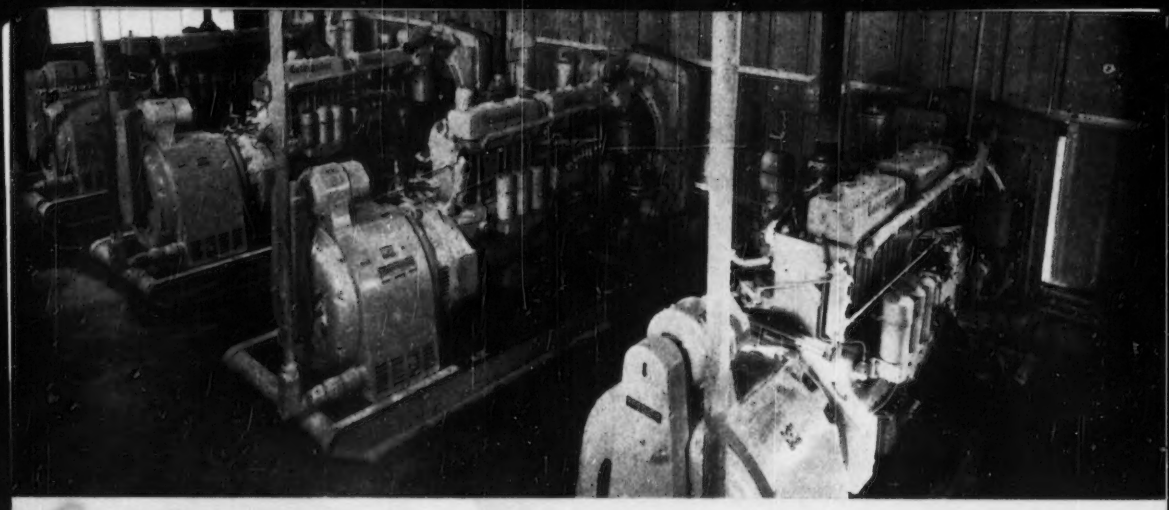
Northwests are proved Rock Shovels with advantages a Rock Shovel should have.

The Northwest Dual Independent Crowd utilizes force other independent crowd shovels waste. Cast Steel Machinery Bases and Cast Steel Machinery Side Frames are better able to take the strains of tough digging. The Cushion Clutch relieves all parts under power from shock loads and increases machine life and cable life. The "Feather-Touch" Clutch Control increases output, assuring easier operation and a *feel of the load* that makes it easier to handle the big ones. These are just a few of the many advantages you won't find in other shovels—just a few of the features that make money in the heart of the Rock Job. Put a Northwest in the *Key Spot* and be sure of the kind of service that makes one out of every three Northwests sold a repeat order.

NORTHWEST ENGINEERING CO., 1509 Field Bldg., 135 South LaSalle St., Chicago 3, Ill.

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem



Main power. These four "Cat" D13000 Electric Sets supply all light and power for the open pit mine of Dicalite Division, Great Lakes Carbon Corp., Mina, Nevada.

"Cat" Electric Sets

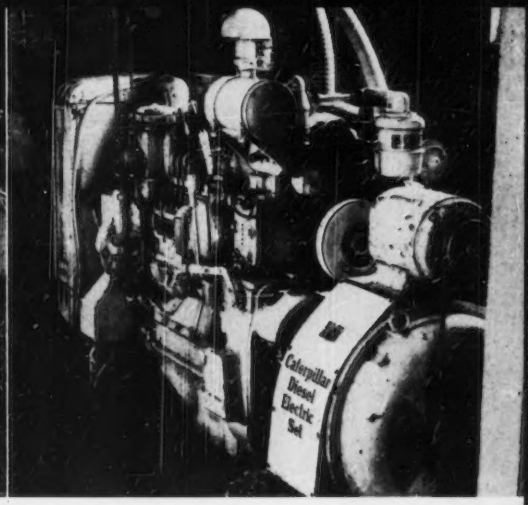
FOR PAY-OFF POWER AT THE MINE

There's no profit in down-time. The only kind of power that pays off in daily production is power you can count on for steady, unfailing operation. That's why mining men who have made money with other "Cat" products choose dependable "Caterpillar" Diesel Electric Sets to power their electrically driven machinery. They get the full advantage of built-in "Caterpillar" stamina, a familiar engine, simple in design and easy to operate, and the matchless service supplied by "Caterpillar" dealers everywhere.

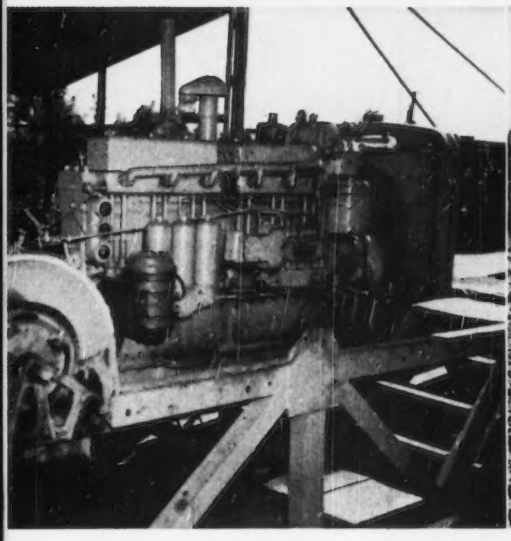
CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

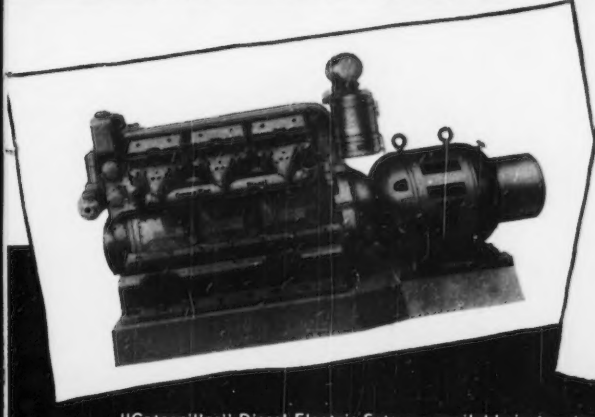
DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

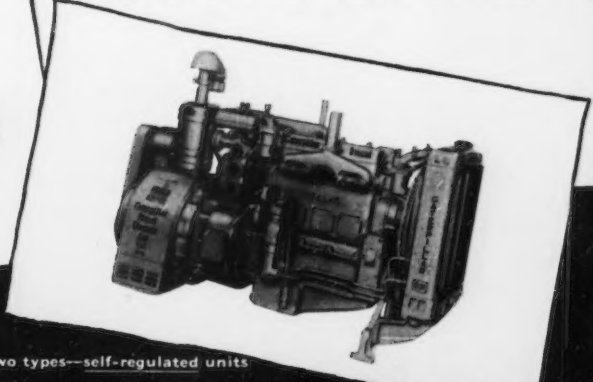


Standby power. Swansea Mines, near Lincoln, Montana, have a reliable source of auxiliary and emergency power in this "Caterpillar" D4400 Electric Set.

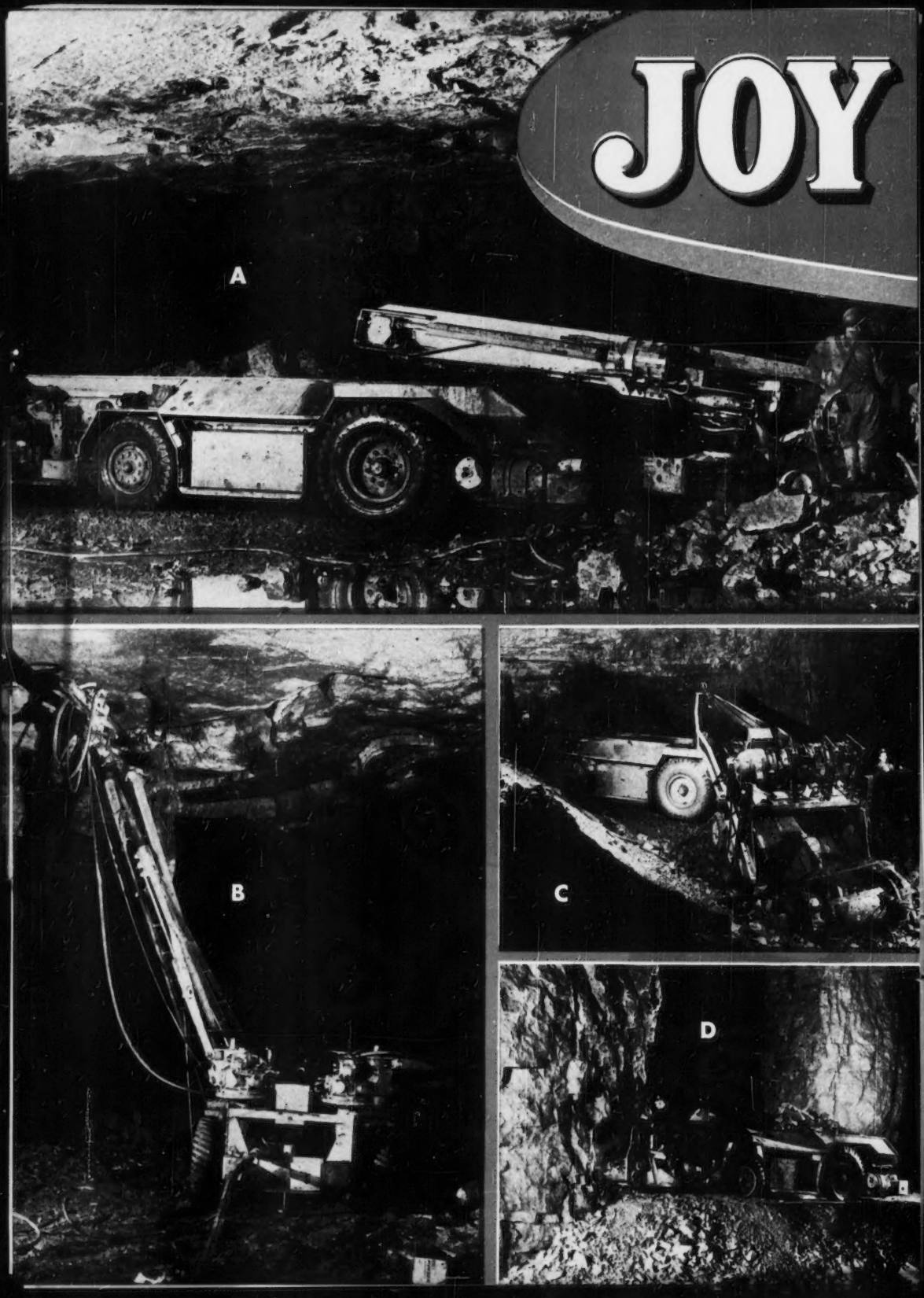


Dredge power. A "Cat" Electric Set drives the screen, pump and supplies lights for the operation of General Dredging Corporation's gold dredge on Alder Creek, California, producing 3,500 cu. yds. per day.





"Caterpillar" Diesel Electric Sets are available in two types—self-regulated units in six sizes to 100 kw. and externally regulated sets in ten sizes to 314 kw. In both, heavy-duty generators and engines are matched and balanced for top performance and maximum economy.


JOY
A
B
C
D

MECHANIZED EQUIPMENT

in the SOUTHEAST MISSOURI Area

. . . does the *DRILLING, LOADING* and *HAULING JOBS* with *TOP EFFICIENCY*

JOY DRILLMOBILES

In photograph B on the facing page, the long reach of a JOY Drillmobile is being utilized in taking down back. These rubber-tired, self-propelled, twin-boom units are setting new standards of fast, low-cost drilling in modern trackless mining, both in the metal and non-metallic fields. JOY Drillmobiles are fast-tramming, highly maneuverable machines, available in three sizes for work in any size heading or in stopes where the grade is not too steep. Drills can be equipped with long feed or standard drifter cradles and are mounted on JOY Hydro Drill Jibs, which make hole-positioning easy and accurate, and permit remote control for maximum safety. ● *Write for Bulletin 87-F.*

JOY 18-HR-2 LOADERS

Photograph A at the top of the page at left shows a JOY high capacity, continuous-type Hard Rock Loader in operation, loading into a JOY Shuttle Car in one of the mines of the Southeast Missouri Lead Belt. This heavy-duty, crawler-mounted machine loads up to 12 tons per minute, producing high tonnage at low cost in trackless mining. It is ruggedly built to handle hard and abrasive rock and ores. The JOY gathering mechanism (not shown in the picture) assures top efficiency, and the chain conveyor swings 45° to either side of center to meet various loading requirements. A smaller model, the JOY 17-HR Loader, is built for use in more restricted areas. ● *Write for Bulletin J-108.*

JOY SHUTTLE CARS

The versatility and flexibility of JOY Shuttle Cars in metal and non-metallic trackless mines is well illustrated by the photographs on the opposite page. In photos A and C, JOY Model 60 Shuttle Cars are shown being loaded by a JOY Hard Rock Loader and a scraper, respectively; and in photograph D, a car is shown making fill. JOY Model 60 Shuttle Cars (up to 14 tons capacity) are designed to give you rapid and low-cost transferring of rock and ore from loading points to main haulage systems. They are ruggedly-built, fast-tramming cars, with conveyor bottoms to speed loading and unloading and are available with hydraulic cable reel, trolley or diesel drive to suit operating conditions. ● *Write for Bulletin J-200.*

JOY SLUSHERS

In photograph C on the facing page, a JOY electric motor-operated three-drum Slusher is shown mounted over a scraper ramp, which in turn is mounted on a JOY Drillmobile chassis for easy maneuverability in a Southeast Missouri mine. JOY Slushers are available in a full range of two and three-drum models, including air or electric-powered types, adaptable for automatic or remote control if desired and built for heavy duty with low maintenance. Allied JOY equipment includes a complete line of air, electric or gasoline engine-powered single-drum Hoists, Air Motors and Winches, Carpullers and Ropepullers, Sheave Blocks and Scrapers. ● *Write for Bulletin 76-Y on JOY Slushers and Bulletin 76-X on JOY Hoists.*

Consult a Joy Engineer

W&D M3303

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

doing this *costs more* now!

You do it less often

by using Dependable Quality

CRANE VALVES

That's why more Crane Valves are used than any other make

. . . this valve likes tough throttling jobs

—And for durable, maintenance-free service, it's typical Crane quality. The plug-type disc and seat construction in Crane No. 14½P's utilizes the toughest combination of metals found in 150-Pound brass valves. Extra wide seating surfaces give high resistance to damage by "wire drawing" or foreign matter. Crane disc taper is precisely correct for accurate flow regulation.

Whether you need throttling valves or any other type, you'll pay less in the long run by insisting on Crane Quality. Get a demonstration by your Crane Representative.

CRANE

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

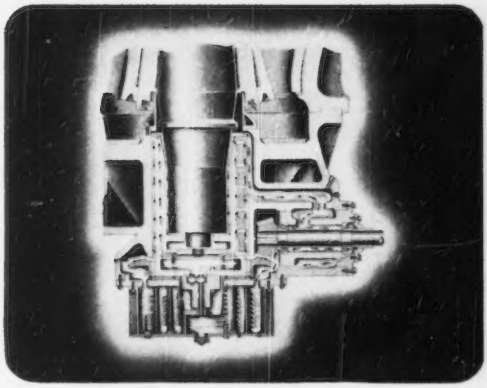
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

First Choice

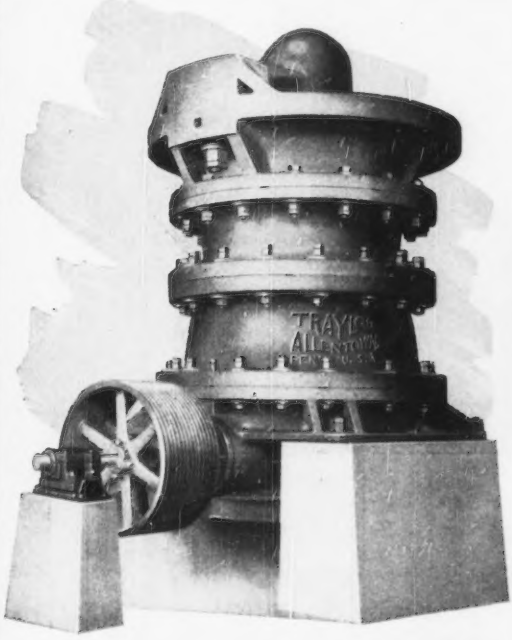
when Huge Tonnage is a Primary Problem

Many plants of less than 10,000 tons daily capacity, and *all larger plants*, will operate with greater efficiency using a Traylor Gyratory Crusher for primary breaking. That's because of its very large capacity in relation to power required.

But, tremendous capacity is not the only advantage of the Traylor Gyratory Crusher. The receiving openings of all models are ample. This teams them efficiently with all large capacity material handling equipment. Operated at, or near, capacity, the power they use is extremely low per ton. Simple design and superb construction reduce maintenance . . assure long, trouble-free operation.



Among the features of these fine crushers is a positive, automatic, pressure-feed lubrication system. Every moment of operation the full length of the eccentric bearing and the main pinion are bathed in cooled oil from a generous reservoir kept dust-free with Traylor's exclusive, effective dust seal.



Bulletin 4100 contains a complete description and pictures of the Traylor Gyratory Crusher as well as basic tables and information to help you make your selection of a crusher on the basis of best operating practice. Write for your copy today.

TRAYLOR ENGINEERING & MANUFACTURING CO.
218 Mill St., Allentown, Pa.

Sales Offices: New York, N. Y., Chicago, Ill., Los Angeles, Calif.
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

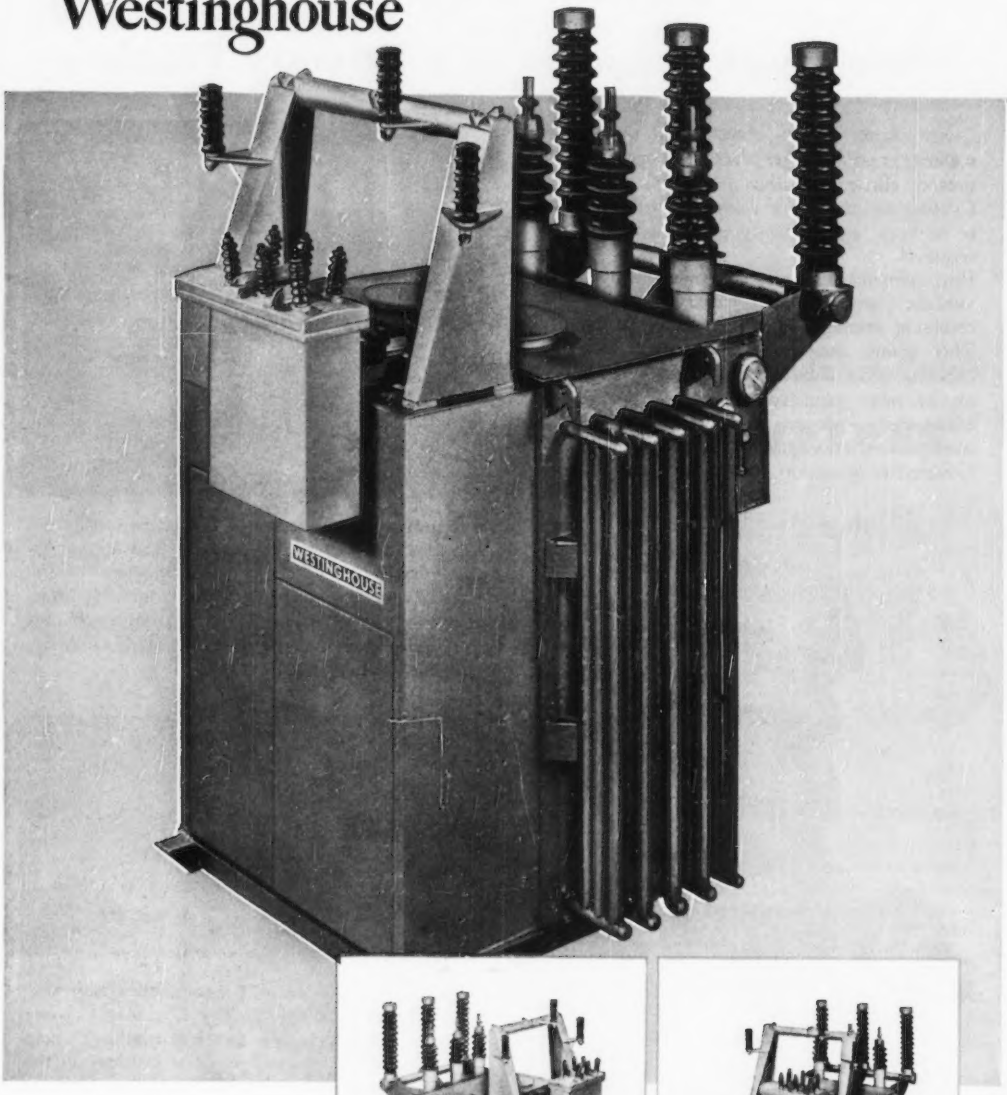
Traylor

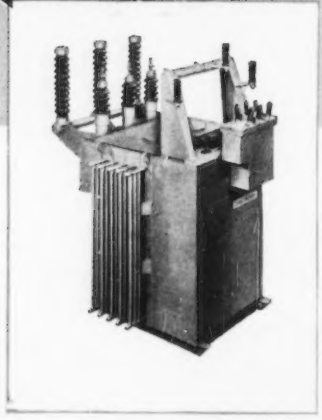
Rotary Kilns, Coolers and Dryers
Grinding Mills . Crushing Rolls
Jaw, Reduction and Gyratory Crushers

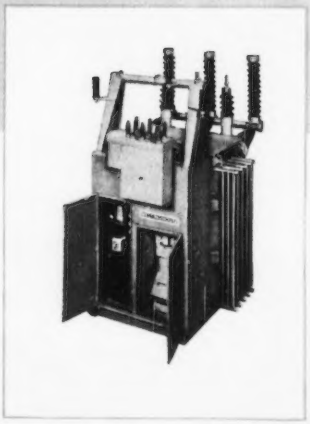
A "TRAYLOR" LEADS TO GREATER PROFITS

YOU CAN BE SURE.. IF IT'S

Westinghouse







The JUNIOR "CSP" POWER TRANSFORMER

NEW ECONOMY

...for small capacity substations

Here's the substation that fills a long apparent need in the power distribution field . . . a smaller, yet complete, substation with integral high and low-voltage switchgear as well as metering equipment. And what's more, it's "CSP" (Completely Self-Protecting), with both thermal and lightning protection built in.

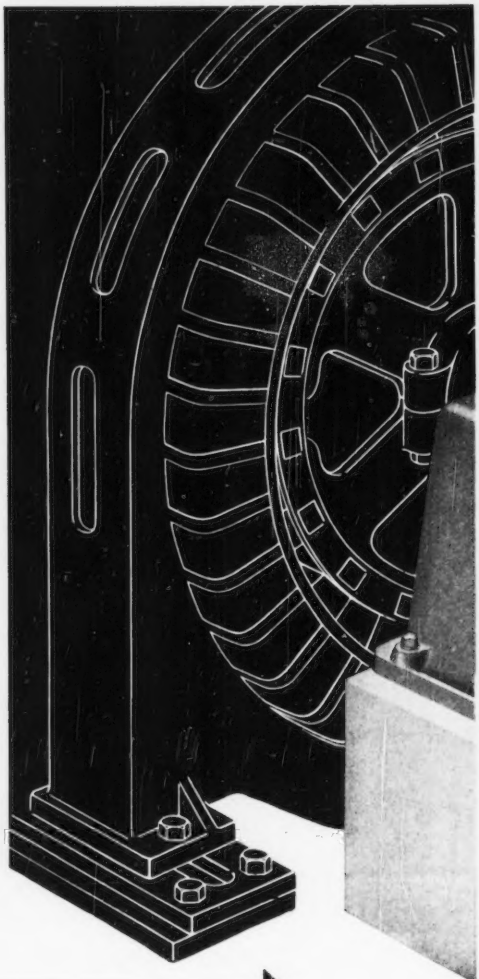
Designed for small towns and similar areas where the capacity of the feeder does not justify a larger rated "CSP" Power Transformer, the new "CSP" JUNIOR provides all the advantages of compactness, simplicity and ease of operation . . . PLUS *low cost.*

Available in 300 to 1000-kva ratings. For further information on all ratings of "CSP" Power Transformers, contact your Westinghouse representative, or write for Booklet B-4692. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70572

Westinghouse

TRANSFORMER EQUIPMENT

FIRST with roller bearings THROUGHOUT



IN A HORIZONTAL DUPLEX COMPRESSOR

- SPHERICAL ROLLER MAIN BEARINGS
- SPHERICAL ROLLER CRANKPIN BEARINGS
- HEAVY-DUTY NEEDLE BEARINGS AT CROSSHEAD

Chicago Pneumatic's Class O-CE AIR COMPRESSORS are the first horizontal duplex, side crank compressors to have anti-friction roller bearings throughout . . . spherical roller main and crankpin bearings . . . heavy-duty needle bearings at the crosshead pins.

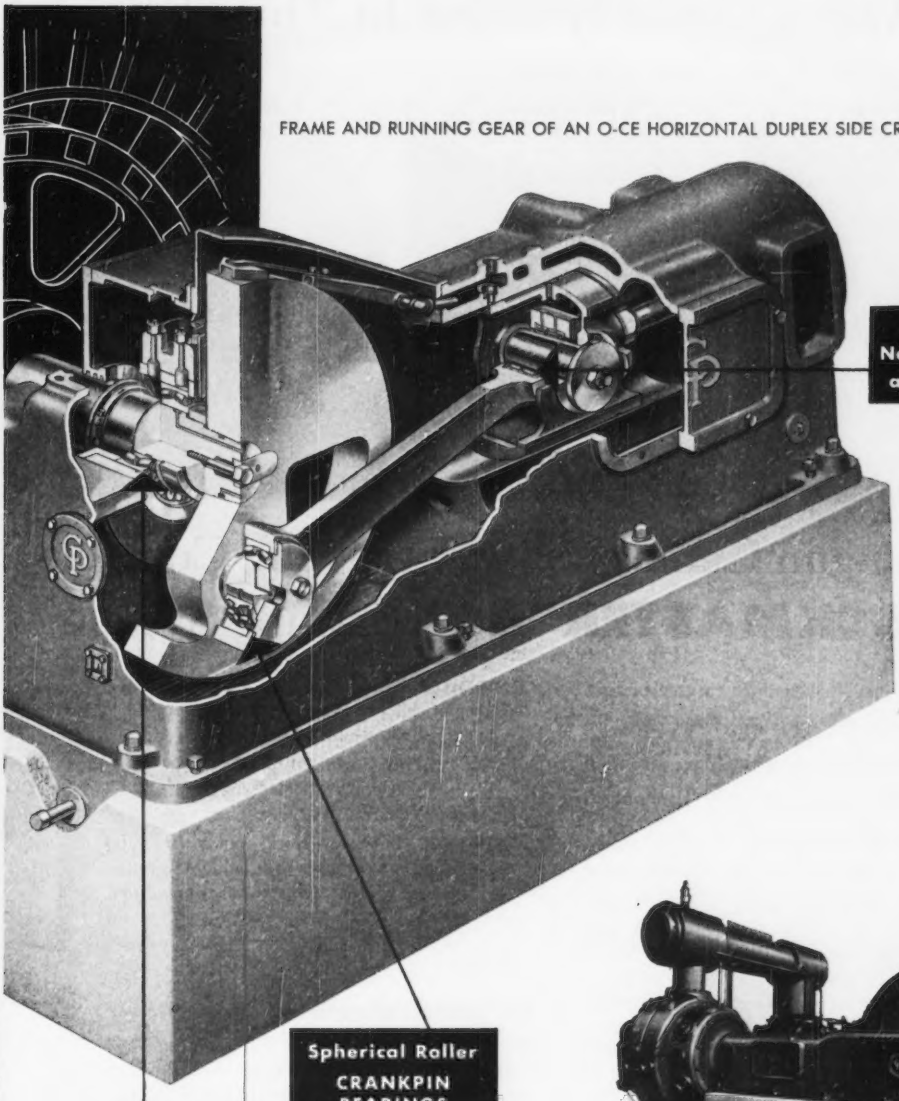
To the user, "roller bearings throughout" means easier and cheaper maintenance, and no possibility of improper bearing adjustment with resultant serious damage to frame and running gear.

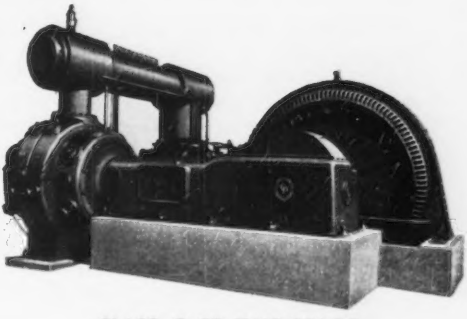
Roller crankpin bearings permit the use of solid-end connecting rods—the strongest, safest type.

This revolutionary innovation is made possible by the recent development of the oil injection method of bearing and crank disc installation and removal. This simple method, requiring only a hand-operated oil pump and ordinary hand tools, is employed also for the application or removal of gears, couplings and sleeves on shaft ends.

Class O-CE Motor-driven Compressors are furnished in sizes up to 2000 h.p.

FRAME AND RUNNING GEAR OF AN O-CE HORIZONTAL DUPLEX SIDE CRANK COMPRESSOR





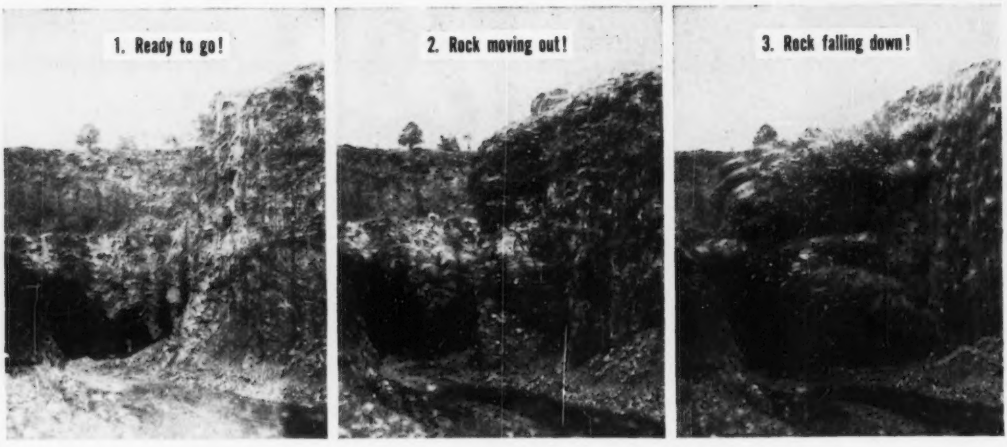
CLASS O-CE TWO-STAGE
MOTOR-DRIVEN COMPRESSOR

Write for Bulletin 726-5

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

No Wasted Gases Spouting In This Shot!



Machine-gun Camera Shows Blasting Control with **ROCKMASTER "16"** Blasting System

WE DIDN'T just "happen" to catch a picture of this blast at the right time! Actually, we got over 15 photos of this blast, using a special "machine-gun" camera. The photos here are spaced at ⅔ second intervals. They give positive proof that the ROCKMASTER split-second delay blasting system can give the kind of *blasting control* that blasters dream about.

For example:

CONTROLLED *Force*—You pay for the energy of explosives gases. You want them to w-o-r-k on your burden—not be wasted in the air. There's not a sign of wasted gas in this shot, even when the rock has moved clear out and is ready to drop.

CONTROLLED *Throw*—Not a rock appears above the top of this 180-foot face. You get your rock in high or shallow piles, against the face or away from it—*as you want it*—with the ROCKMASTER system, because the system is adjustable to fit *your requirements.*

CONTROLLED *Breakage*—Rock ready for the shovel! You can see it without a doubt in photo No. 3. And if you're interested in stripping coal and getting bigger lump—ROCKMASTER can often help you do that, too—with substantial savings in your explosives costs.

For rock, coal, ore—on the surface or underground

Write for your copy of the ROCKMASTER "16" booklet showing how *you* can profit through use of the correct members of the series of 16-split-second delay electric blasting caps, with the ROCKMASTER system of explosives choice and loading methods. Our technicians will be glad to assist you in applying ROCKMASTER to your operations.

ROCKMASTER: Reg. U.S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • ***Offices in principal cities*** • ***Cable Address—Atpowco***

NOW...

MOISTURE RESISTANCE

OZONE RESISTANCE

RESISTANCE TO HEAT and AGING

... All Three In One High-Voltage Cable!

Study the facts behind high-voltage cable failures and you'll readily realize just how much moisture resistance, ozone resistance, and resistance to heat and aging mean to high-voltage transmission and distribution systems. Now — for the first time — all three properties are combined in a single insulation, Anhydrex XX — available only in Simplex-ANHYDREX XX Cables.

Aged in an air oven at the grueling temperature of 250 F. (121 C.), Anhydrex XX has proved itself to be far and away your most dependable assurance of low-cost, trouble-free cable operation at the higher voltages. Here's how:

Aged for 16 weeks, it retained approximately 50% of its tensile strength, nearly 68% of its elongation. More than that, its rate of deterioration after the first few weeks was very slight, indicating exceptional stability and long life. It remained rubber-like in quality and appearance and was still suitable for further use. Compare this with ordinary vegetable oil base and heat-resistant compounds which, inside of only 3 weeks, became brittle and cracked and crumbled.

Aged for 7 days, Anhydrex XX was immersed for a week in distilled water at 158 F. (70 C.) and absorbed less than 15 mg. per square inch of exposed surface.

Aged for 7 days, it was bent around a mandrel and exposed to .03% ozone for 4 hours yet would not crack.

Compare these values with those of any other high-voltage insulation. You'll find a big difference; a difference that pays off in more economical, more efficient, and more reliable power transmission whenever Simplex-ANHYDREX XX Cables are on the job. If you would like more complete information and specification data on Anhydrex XX, simply drop us a line at the below address.

SIMPLEX WIRE AND CABLE COMPANY
79 Sidney Street, Cambridge 39, Massachusetts

UNDIVIDED RESPONSIBILITY . . . from Ore Test to Mill Installation

You Need This Complete DENVER SERVICE

If you are planning

(A) New Mill
(B) Expanded Production
(C) Changed or Improved Operation . . .

these specialized Deco Services will save you time and money . . . help you develop a profit-making operation . . . eliminate **hazards of divided responsibility.**

1 *Ore Testing*

During the past 5 years Deco Engineers have successfully completed more than 1000 tests on 85 different ores from 40 countries. Results of Deco tests are reflected in hundreds of successful installations . . . proof that Deco test results **can be duplicated** in full-scale operation.

Deco Laboratory Tests provide

(A) Complete batch or continuous test data
(B) Recommended flowsheet considering local conditions.
(C) Description and size of equipment to produce desired tonnage.

2 *Complete Mill Equipment*

You can, **from one source of supply,** secure complete mill equipment "from Testing . . . to Feeder . . . to Dryer." Deco equipment is engineered to do a better mineral recovery job—and do it more economically. All Deco machines are standard, job-proved to give dependable 24-hour service.

3 *Mill Layout*

Experienced Deco Engineers can plan your mill layout to assure maximum operating efficiency and convenience. Or, they will gladly cooperate with your own staff or with your consulting engineers.

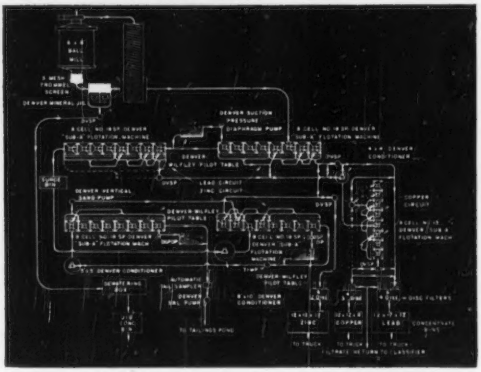
4 *Follow-up Field Service*

Our responsibility begins even before we receive your order. We want your mill to be a success. Our Field Engineers and Metallurgists will do everything possible to keep your mill operating most efficiently and pass on to you new developments to improve your metallurgy.

5 *Helpful Publications*

Our publication **"Deco Trefoil"** is an exchange of operating data from successful milling plants including helpful operating hints, laboratory notes and new metallurgical developments. **Deco Equipment Bulletins** are informative descriptions of machines, equipment and services of value to operators. We are constantly in touch with leading mines, mills, universities, research and other testing bureaus in order to bring our friends the most modern, up-to-date metallurgical data possible.

Comprehensive tests conducted in the Deco Ore Testing Laboratory are the basis for flowsheets—whether technically simple or involved. Design of milling plants based on recommended flowsheets assure desired metallurgical results.



Mills, designed and built by Denver Equipment Company, make high metallurgical recoveries at low cost for operation. A Deco Field Engineer contacts the company regularly, works with management in making suggestions and operating refinements to further capacity and improve metallurgical results.

Take advantage of these services.
Just write . . . A simple letter is all that is necessary. Explain your operation and objective. Our cooperation will be immediate and sincere. Write NOW to any one of the conveniently located Deco Offices.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEERS

"The firm that makes its friends happier, healthier and wealthier"

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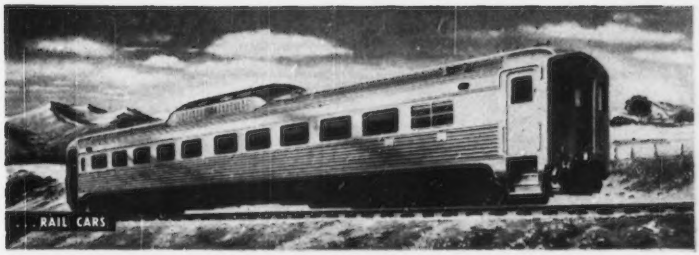
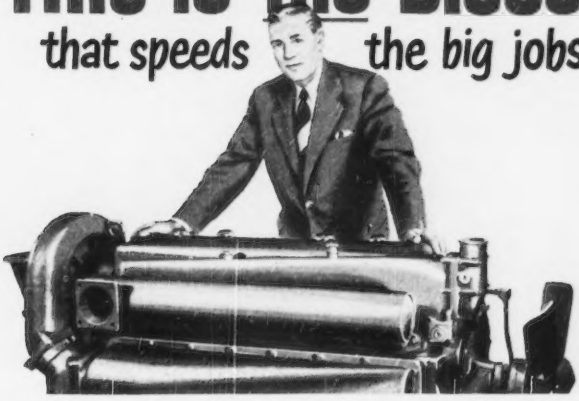
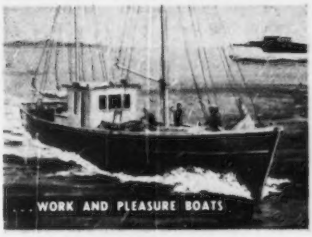
DENVER EQUIPMENT COMPANY, 1402 17th St., Denver 17, Colorado



This is the Diesel

that speeds the big jobs





HERE IT IS—the newest member of the General Motors Diesel family—the brawny 6-110 engine that develops 275 horsepower.

It is 50% more powerful than the famous 6-cylinder GM "71" engine that powers so many trucks, buses, boats, construction equipment and other mobile, portable and stationary units.

This rugged new Diesel doesn't care what's tied to its tail. It has power to spare to keep big jobs humming, yet is so compact it doesn't hog space.

For example, each new Budd RDC rail car is driven by a pair of 6-110 Diesels with GM torque converter transmissions. The compactness of these power plants permits mounting them under the floor so that no revenue space is lost. These rail cars accelerate from standstill to 44 miles per hour in just one minute and have a top speed of 83 mph with a full load.

Like all other GM Diesel engines the 6-110 is two-cycle—delivers power on every piston downstroke. This advanced design cuts down Diesel size without sacrificing ruggedness; it insures fuel economy, lower maintenance costs, exceptional dependability and long life.

The GM 6-110 engine provides Diesel power at its best for heavy-duty jobs—not only for rail cars but in the largest mountain-type trucks, huge rock crushers, deep-sea fishing and pleasure boats, big pumps and compressors, mining and oil field equipment. *It is an exceptionally compact Diesel for its horsepower—an engine that gives remarkably fine performance in minimum space.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up TO 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up TO 800 H. P.

GENERAL MOTORS

Hear HENRY J. TAYLOR on the air every Monday evening over the ABC Network, coast to coast.

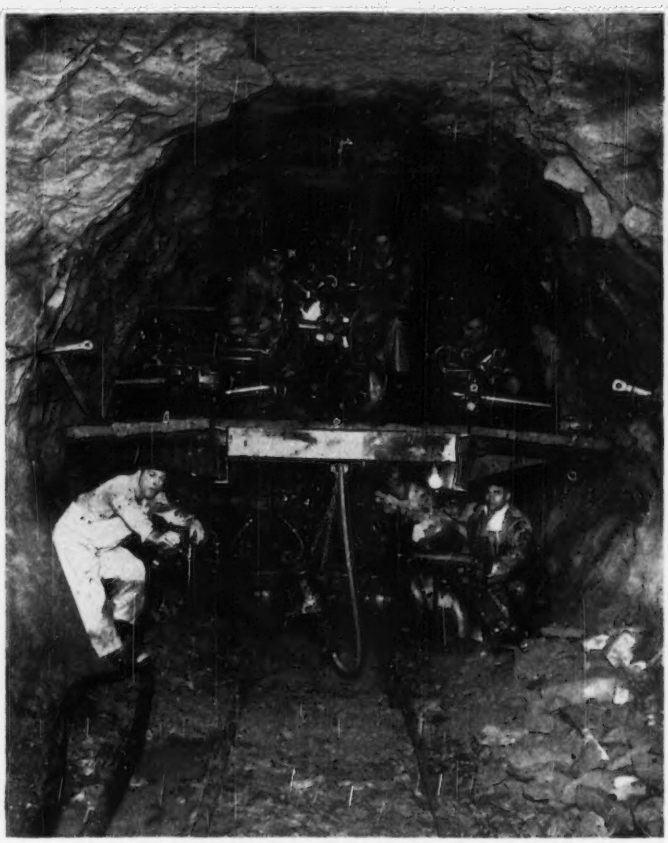
GM
GENERAL MOTORS
DIESEL POWER

Only GM Diesels provide all these advantages

Compact size—less weight per horsepower . Two-cycle smoothness, power on every downstroke . Quick starting, on its own fuel . Unit injectors—no high-pressure fuel lines . Rapid acceleration . Cleaner burning . Better high-altitude performance . Easy accessibility.

"Your Key to GM Power Economy"

Neversink Tunnel in Catskills to Aid Thirsty New Yorkers



Two drill jumbos built by Frazier-Davis mount five drifter drills on air-powered booms. These drill about 40 holes, 9½-ft deep, into sandstone and shale, in 1½ hours. A sixth drill is at the back for auxiliary drilling.

New Yorkers are looking with confidence to the scenic Catskills for major relief from the threat of water shortages. Completion of three reservoirs by 1955 is expected to pour about 540 million additional gallons each day into the existing Delaware Aqueduct, nearly half of New York's present daily demand. An interesting phase of the new Delaware Water Supply Project is the Neversink Tunnel, being driven through nearly six miles of rock to connect two of the new reservoirs now under construction.

Frazier-Davis Construction Co. was awarded the $15,600,000 contract for this vital tunnel that will allow about 105 million gallons of gushing water each day to flow downgrade from Neversink Reservoir through a mountain into a 25,000-kw hydroelectric plant and then into Rondout Reservoir. Intake and outlet chambers, a water-release tunnel, and other jobs are also a part of the contract.

In driving the 12½-ft-diameter Neversink Tunnel, Frazier-Davis uses two all-welded drill jumbos of their own design. A V-cut round of 36 to 40 holes is drilled with five drifter drills, using carbide-tipped bits on 1¼-in. rods of Bethlehem Hollow Drill Steel. Six rounds are usually completed every 24 hours in each of two headings for an average daily progress of 50 ft per heading. The tunnel will probably be excavated by the end of 1950, while its completion is scheduled for the end of 1952.

Roy Gunther, Project Manager for Frazier-Davis, comments about the Bethlehem Hollow Drill Steel, which was used exclusively: "We have had exceptional luck in drilling through both shale and hard sandstone. The steel has done a very good job—better than we expected."

All drill steel is returned from the headings to the blacksmith shop every 24 hours. Here it is checked and given any necessary redressing to assure best drilling performance.

★ BETHLEHEM STEEL ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

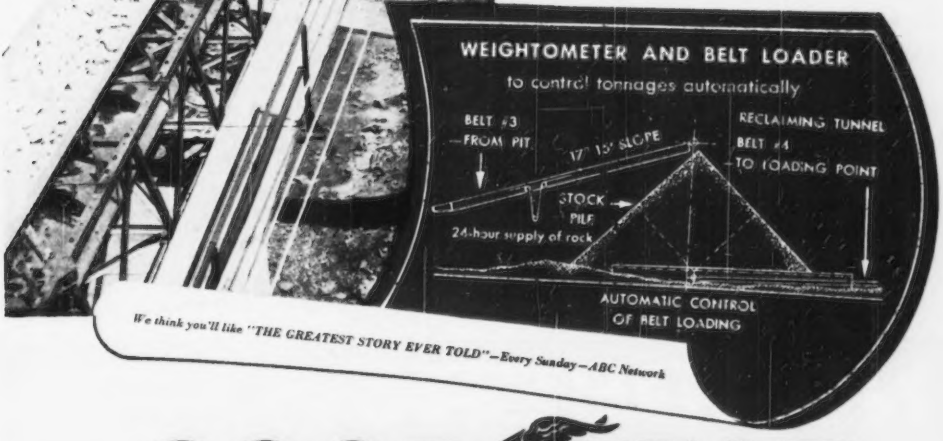
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM HOLLOW DRILL STEEL

These belts outwork 6 trains!

IN a Virginia quarry, a system of four Goodyear conveyor belts—one of which you see here—carries limestone that six donkey-engined trains used to carry laboriously from quarry to plant. The conveyor system, designed by the G.T.M.—Goodyear Technical Man—is ¾-mile long, instead of the six miles of track the railway system used. In addition to short-line haulage, the belts have larger ton-per-hour capacity, making stock piling at the processing end easier. Constant flow ends spotty loading. Haulage costs are far lower, too.

You can consult the G.T.M. on any materials-handling problem by phoning your nearest Goodyear Industrial Rubber Products Distributor, or writing Goodyear, Akron 16, Ohio.

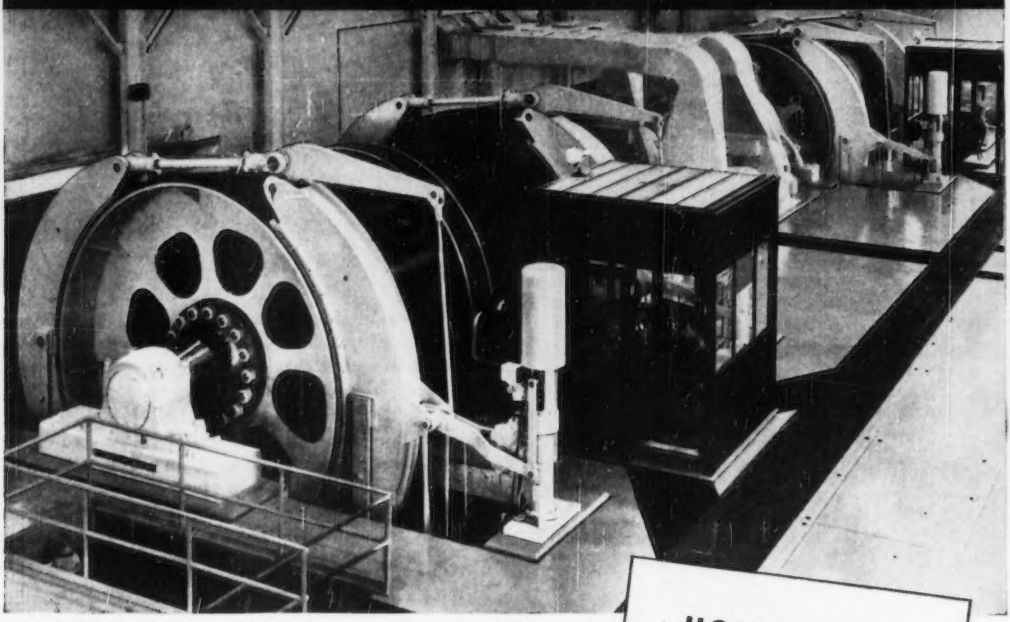


We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER

TWO MORE *NORDBERG* MINE HOISTS for Cleveland-Cliffs Iron Co.



WHEN Cleveland-Cliffs Iron Company decided to buy Mine Hoists for their *Mather B* shaft at Ishpeming, Michigan, they again selected Nordberg as a result of the excellent performance of Nordberg Mine Hoists at *Mather A* Mine.

Repeat orders like this are convincing evidence that Nordberg machinery has no equal in the mining field.

Our engineers will gladly help you determine the hoist design most applicable for your operation. Write for detailed information today.

HOIST DATA:

These two Nordberg Mine Hoists, one for ore and the other for men, have 12 ft. double drums of 96" face winding 1⅞" dia. rope. They are designed for a depth of 4000 ft. Rope pull on the ore hoist is 69,000 lbs. and on the man hoist, 54,900 lbs. The ore hoist speed is 2400 ft. per min. and the man hoist operates at 2000 ft. per min. Two 1500 hp, 600 rpm d.c. motors drive the ore hoist and one 1500 hp, 600 rpm d.c. motor the man hoist.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
MEXICO D. F. • LONDON • TORONTO • JOHANNESBURG

M507F

NORDBERG
Machinery for processing ores and industrial minerals

Primary Crushers

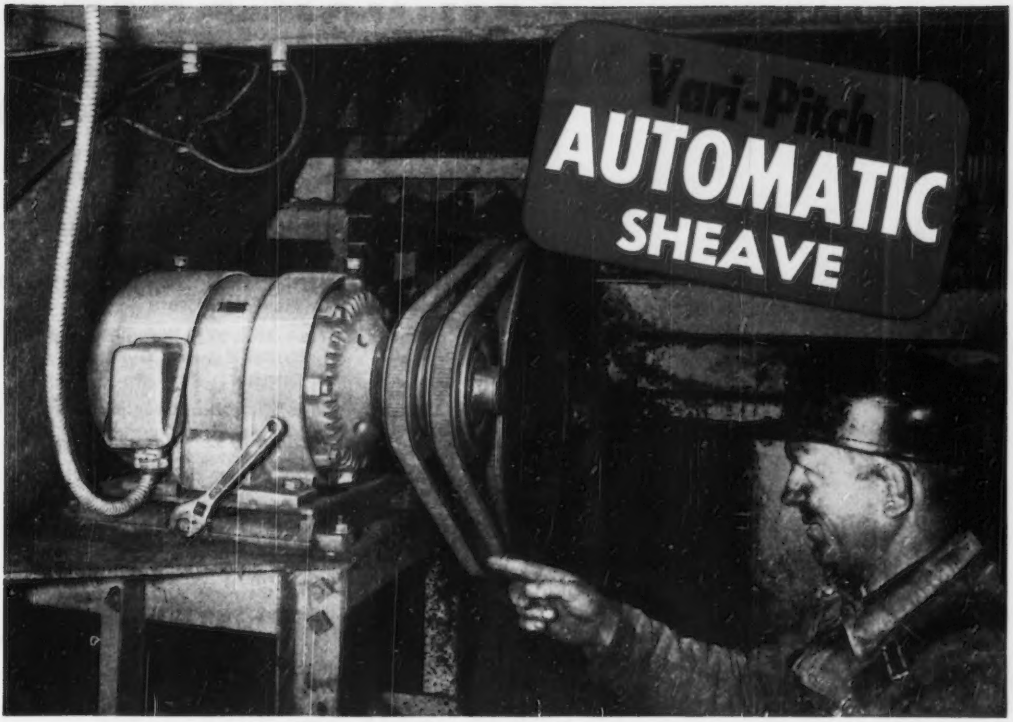
Vibrating Bar Grizzly

Symons Rod Deck Screen

*Grinding Mills

Mine Hoist

Diesel Engines



Best Buy in Variable Speed!

COMPARE THESE FEATURES of *Vari-Pitch* Automatic sheave with any other variable speed drive and see why *Vari-Pitch* Automatic drive gives you more for your drive dollar.

1. Changes speeds with one hand while machine is running.
2. All mechanism is inside one sheave actuated by movement of the motor base.
3. Ample capacity and safety factor of multiple belts.
4. Full range of sizes from 1 to 40 hp.
5. Top speed is 100% higher than low speed.
6. Quiet operation.
7. Cushioned start.
8. Simple design and easy installation make cost low.
9. Occupies no more space than ordinary sheave.

Vari-Pitch Automatic drive will pay for itself very quickly in increased production, improved quality and more flexible operation on many machines in your plant. Ask your Allis-Chalmers Authorized Dealer or Sales Office representative to give you savings and cost figures on your operations. Or write for bulletin 20B7223.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

Hydrocone, Vari-Pitch, Texrope, Ripl-Flo are Allis-Chalmers trademarks.

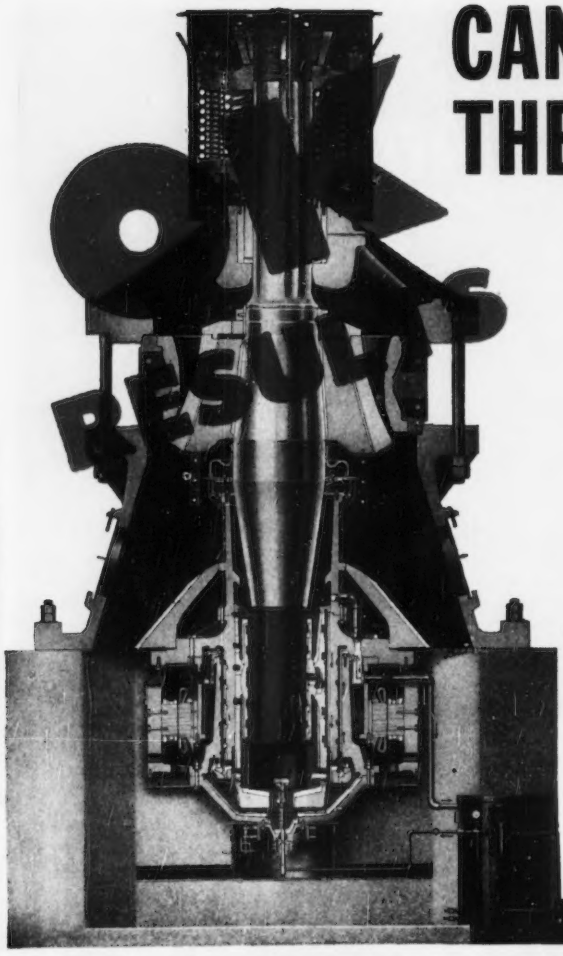
A-3064

ALLIS-CHALMERS

See These Allis-Chalmers Products — at Metal Mining Show!

See a Hydrocone crusher in operation — the gyratory crusher now available in a new, wider range of sizes. See — an operating Ripl-Flo vibrating screen . . . a rubber lined pump . . . a solids handling pump with automatic Texrope drive . . . new motors . . . motor starters . . . a new air break contactor!

CAN YOU BEAT THESE FIGURES?



We repeat them — for your greater crushing profits.

Location: **Nationally known Mining Co. in New York State**

Crushers: **Four No. 37½ Kennedy type "S" Roller Bearing Gyratory Crushers**

Feed Opening: **6¼"; Diameter of Head: 3 Ft.**

Discharge Setting: **7/32" Closed Side at Head**

Capacity Each Crusher: **56 Tons Per Hour**

Horsepower Each Crusher: **48 HP.**

Closed Circuit Operation:

Gradation as Follows:

CHECK THE FIGURES!

99.8%	**Minus**	**3**	**Mesh**
93.3	"	**4**	"
80.6	"	**6**	"
66.6	"	**8**	"
56.1	"	**10**	"
48.1	"	**14**	"
40.6	"	**20**	"

No Sir — you CAN'T beat these "KVS" figures! They speak for themselves!

CAN A SWING JAW DO MORE?

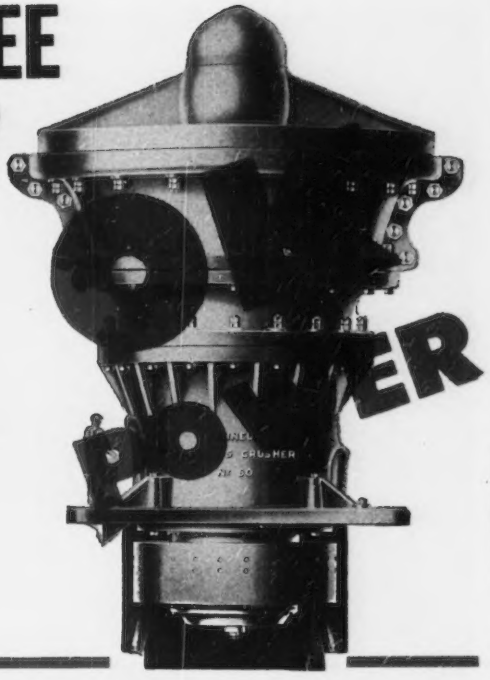
Yes—it COULD, we figured. It could crush MORE with less effort. So we checked POWER-LOSS in the 'KVS" Swing Jaw by making the STATIONARY jaw action carry HALF the load, instead of leaving 100% to the SWING jaw. Another thing we stopped is PARTS TROUBLE. The Swing Jaw is ALL ONE PIECE, except for renewable crushing plate. Note also — "KVS" Swing and Stationary jaws are INTERCHANGEABLE, also reversible end for end. That also MULTIPLIES jaw-crushing life!

ALL ONE PIECE EXCEPT JAW PLATES

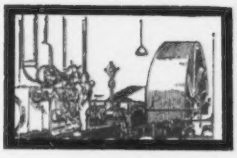
THEY'RE OK

TROUBLES ARE

CAN YOU USE FREE ADDED POWER?

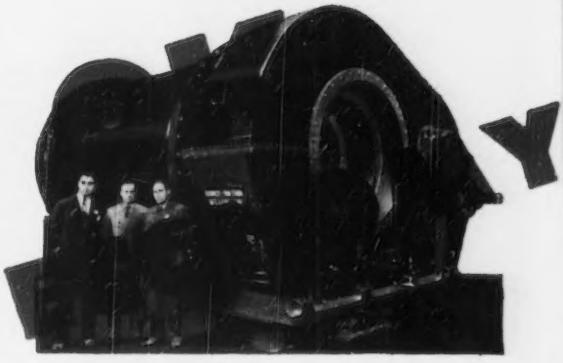


The old Corliss Engine had a big whirling flywheel or pulley that developed KINETIC ENERGY (or, in simple words, added FREE power). The "KVS" Gearless has a big whirling pulley, too! It whirls at 3,500 ft. per minute — it creates the free EXTRA crushing power you get! What's more, the 11-ton pulley (used in a "KVS" Gearless Crusher weighing 400,000 lbs.) turns so easy you can move it with TWO FINGERS! In short, more CRUSHING for LESS POWER COST (with far less vibration and far less NOISE), are ideas that crusher-users have OK'd—that's why they say "OK" to the "KVS" Gearless.



CAN YOU STAND SAVING $5000.?

Who can't? How'd you like to save about that on a 10 ft. tube or ball mill? Well, you CAN save it — if you pick a "KVS" Mill with integral gear drive. Because, with this drive, you use a SYNCHRONOUS MOTOR, at a TREMENDOUS saving! You see, the motor is DIRECT CONNECTED to driving shaft, carried in roller bearings that CANNOT be misaligned or set wrong. Pinion shaft to which the motor is connected runs at about 600 r.p.m. while pinion shafts in other mills run at about 180 r.p.m. "KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically sprayed with oil before tube mill is started (design patented). In 15 years no "KVS" gears or pinions have worn out on this type mill. OK? We think so!



There are "KVS" BULLETINS covering all the above. Write for them today.

OK *- write to...*

Kennedy-Van Saun

MANUFACTURING AND ENGINEERING CORPORATION

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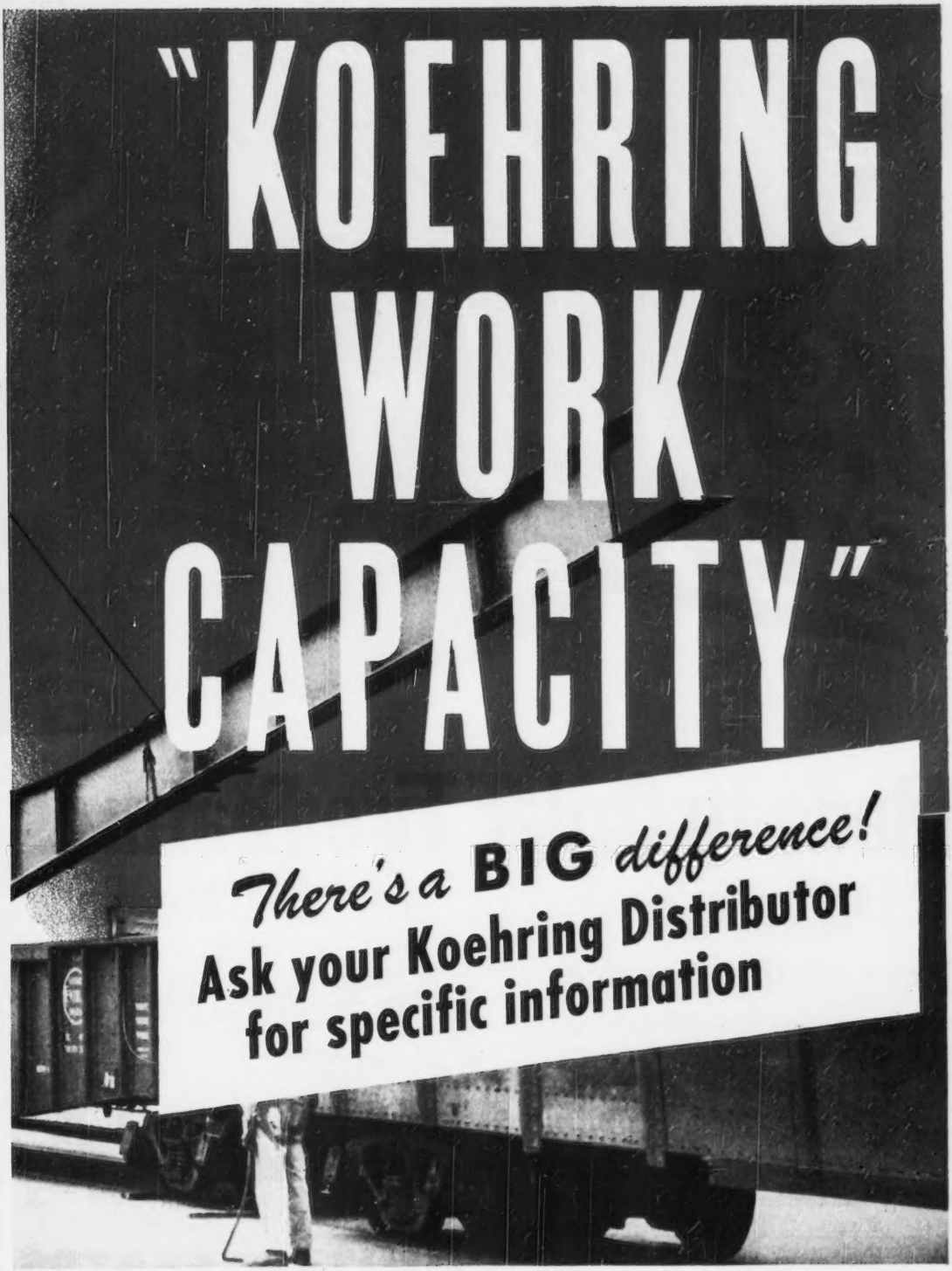
LEFT OUT — *YES SIR!*

Measure by
7¾ to 79½ TONS
lift capacity
½ to 2½ yards
dipper capacity
304
KOEHRING
HEAVY DUTY
KOEHRING COMPANY
Milwaukee 16, Wis.
K46
Subsidiaries: KWIK-MIX • JOHNSON • PARSONS


"KOEHRING
WORK
CAPACITY"
There's a BIG difference!
Ask your Koehring Distributor
for specific information

THE GREAT NEW Mid-Century U.S. ROYAL FLEETMASTER

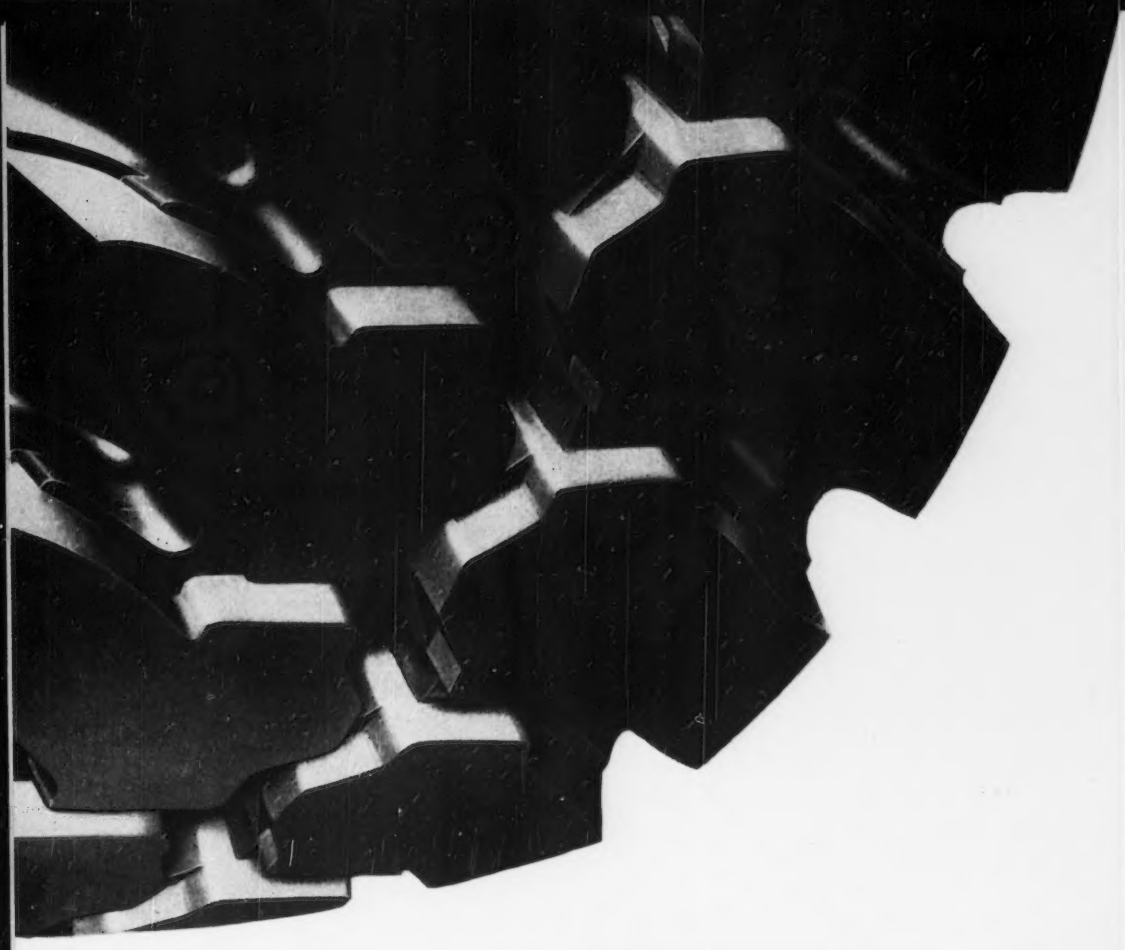
"Made-to-Order" Tire Features Off the Road

Master of Every Mining Service

NEVER BEFORE have mining men had the right answer to their own great tire problem! Never before have they known a genuine on-the-road *and* off-the-road tire—with new mastery of the most extreme mining conditions and demands.

NOW IT'S HERE—the Mid-Century Fleetmaster—with smooth, long-distance highway rolling, with spearhead depth traction to pull through slipperiest surface, up steepest grade.

UNITED STATES



Never Known Before!

On the Road—One and the Same Tire!

★ **From sharp-toothed slag...**
to high-speed concrete!

★ **From mine pit...**
to rain-soaked roadway!

All Purpose Performance Never Known Before

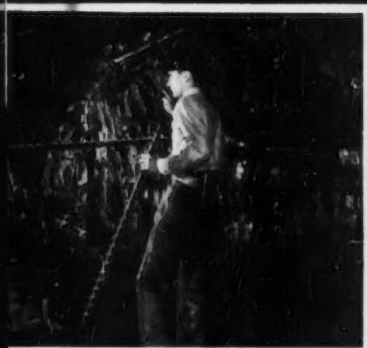
TODAY'S SUPREME TRUCK TIRE WITH HIGHWAY AND OFF-THE-ROAD TRACTION
never possible before!

★ *Job-fitted tread and sidewall compounds*
★ *Free-rolling tread surface*
★ *SPEARHEAD depth traction*
★ **NON-SKID** ★ **CHIP-RESISTANT**

A PHONE CALL DOES IT! This is another U. S. Rubber achievement—without rival, imitator or comparison. Phone your nearest U. S. Royal Dealer for Complete Performance Proof and your own JOB-FITTED SPECIFICATIONS.

RUBBER COMPANY ***America's Largest Maker of Tires***

Proved AND Accepted



IN HIGH-PRODUCTION SERVICE!

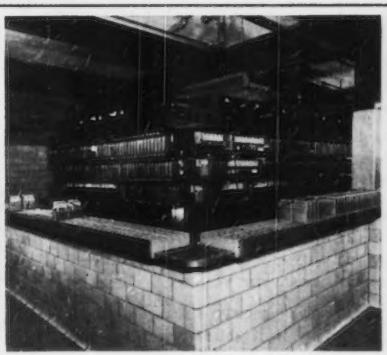
MODEL

Edison R-4

ELECTRIC CAP LAMP

U.S. Bureau of Mines Approval No. 24

The sweeping acceptance of the EDISON Model R-4 Electric Cap Lamp extends from large to small operations throughout modern mining—wherever emphasis is heaviest on increasing production safely with the most advanced equipment! • Combining a *4-cell* Edison nickel-iron-alkaline battery with balanced headpiece providing long-range "spot" or brilliant flood of light, the new Model R-4 furnishes the maximum in effective light and long useful life. Minimum lamphouse handling is a prominent service feature. *Let us arrange a demonstration—and discussion for a more efficient lamphouse layout.*



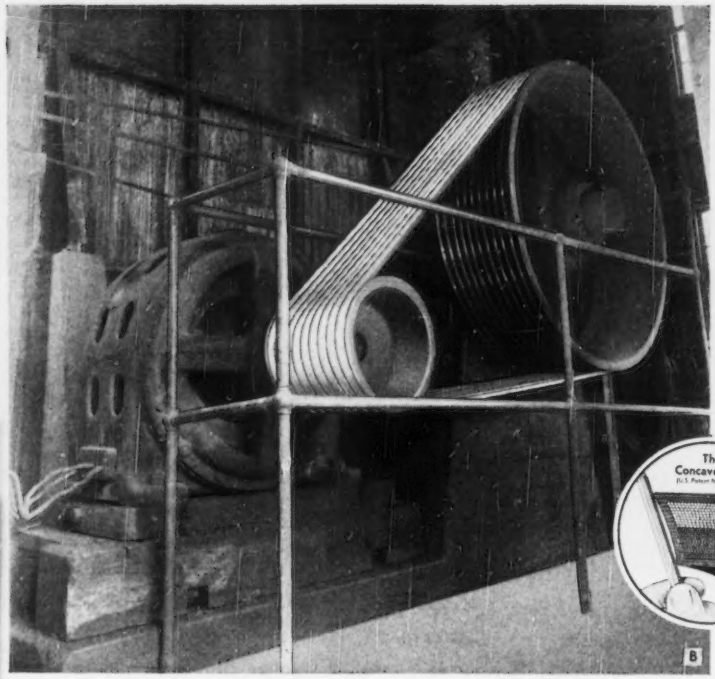
MSA
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

***At Your Service:* 48 BRANCH OFFICES in the UNITED STATES**

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED · Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.
Representatives in Principal Cities in Mexico, Central and South America CABLE ADDRESS; "MINSAF" PITTSBURGH



In many smelters, poisonous fumes from the "sintering" of ore must be drawn through a precipitation machine by a large fan. Should this fan fail, the plant has to be shut down at once. The photo shows how a Utah smelter has safeguarded itself against this possibility by installing a multiple V-Belt Drive on this important fan. The original ropes on the drive are still good after operating 16 hours daily for 12 years.

Gates
REG. U. S. PAT. OFF.
The Mark of SPECIALIZED Research

If you want LOWER V-BELT COSTS, just make this simple test!

Just pick up *any* V-Belt and bend it—exactly as it bends when going around its pulley—and *see what happens!*

The top of the belt is put under tension; hence it grows *narrower.* The body the belt is under compression and *bulges out.*

This change of shape, due to bending a *straight-sided* V-Belt, is shown in figures 1 and 1-A. Note how the bulging sides are forced to press *unevenly* against the V-pulley. This naturally causes uneven wear on the sides—*concentrated wear* where the bulge is greatest.

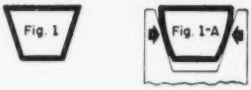
Now look at figures 2 and 2-A. There you see how the bending changes the shape of the V-Belt that is built with the Concave Side—the Gates Vulco Rope. The precisely engineered concave side of this belt merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove.*

Because there is *no bulging,* the sides of the Gates Vulco Rope always press *evenly* against the V-pulley and therefore wear *uniformly* —resulting in *longer belt life* and *lower belt costs for you.*

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly AgainstV-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear!—Longer Life!

CS-5011

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

Here is the New Yardstick for Crawler Tractor Performance

Allis-Chalmers HD-20 Hydraulic Torque Converter Tractor

● **BIG AND RUGGED** . . . 41,800 lb. of properly balanced weight . . . long, wide, sure-gripping tracks. Handles the toughest jobs in stride!

● **POWERFUL** . . . Newest, latest GM 2-Cycle Diesel Engine; Model 6-110. Plenty of POWER . . . for longer life, lower maintenance, increased production.

● **HYDRAULIC TORQUE CONVERTER DRIVE** that eliminates most gear shifting and keeps tractor working smoothly at higher average speeds.

● **SIMPLE UNIT ASSEMBLY** . . major assemblies removed and repaired or replaced without removing adjacent parts.

● **EXTENDED LUBRICATION PERIODS THROUGHOUT** . . . plus 1,000-hour periods on truck wheels, track idlers and support rollers with A-C's POSITIVE SEAL.

● **EVERY OPERATOR COMFORT** . . . seat, platform, controls, visibility . . . hydraulic finger-tip steering, self-energizing brakes, practically no gear shifting.

Get the full story from your Allis-Chalmers dealer. Arrange for a demonstration on your job at the earliest opportunity.

World's Finest Tractor

For Greater Production
For Easier Operation
For Simplified Servicing

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Originator of the Torque Converter Tractor

Constructed to Take Severe Punishment

Without Tube Swelling

CONCORD #20 STEAM HOSE

Here's the steam hose with a structural difference that eliminates . . . once and for all . . . the common failure of tube swelling under continuous high pressure operation.

CONCORD #20 Steam Hose gives you the exclusive protection of a tough inner lining . . . a lining of stainless steel wire braid. This braid assures permanent retention of the original inside hose diameter. It prevents swelling and constriction of the tube . . . assures full flow of steam at all times . . . permits re-coupling in the field when necessary, without the slightest difficulty.

In addition, CONCORD #20 construction features include: two or three braids (depending on size) of alternate high tensile steel wire and rubber layers are firmly bonded over the outside of the tube. They provide maximum burst-protection and safety. An asbestos braid provides positive cover adhesion and serves as cover insulator. On top of all is the rugged, abrasion-resistant cover that withstands the severest abuse.

Flexible, tough and dependable . . . that's BWH's new CONCORD #20! Ask your nearby BWH distributor for a demonstration. Get in touch with him today, or write us direct.

Tube Securely Locked by Special Stainless Steel Inner Wire Braid!

Illustration above shows how exclusive inner stainless steel braid of CONCORD #20 Steam Hose prevents tube swelling and assures long life under severe use.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

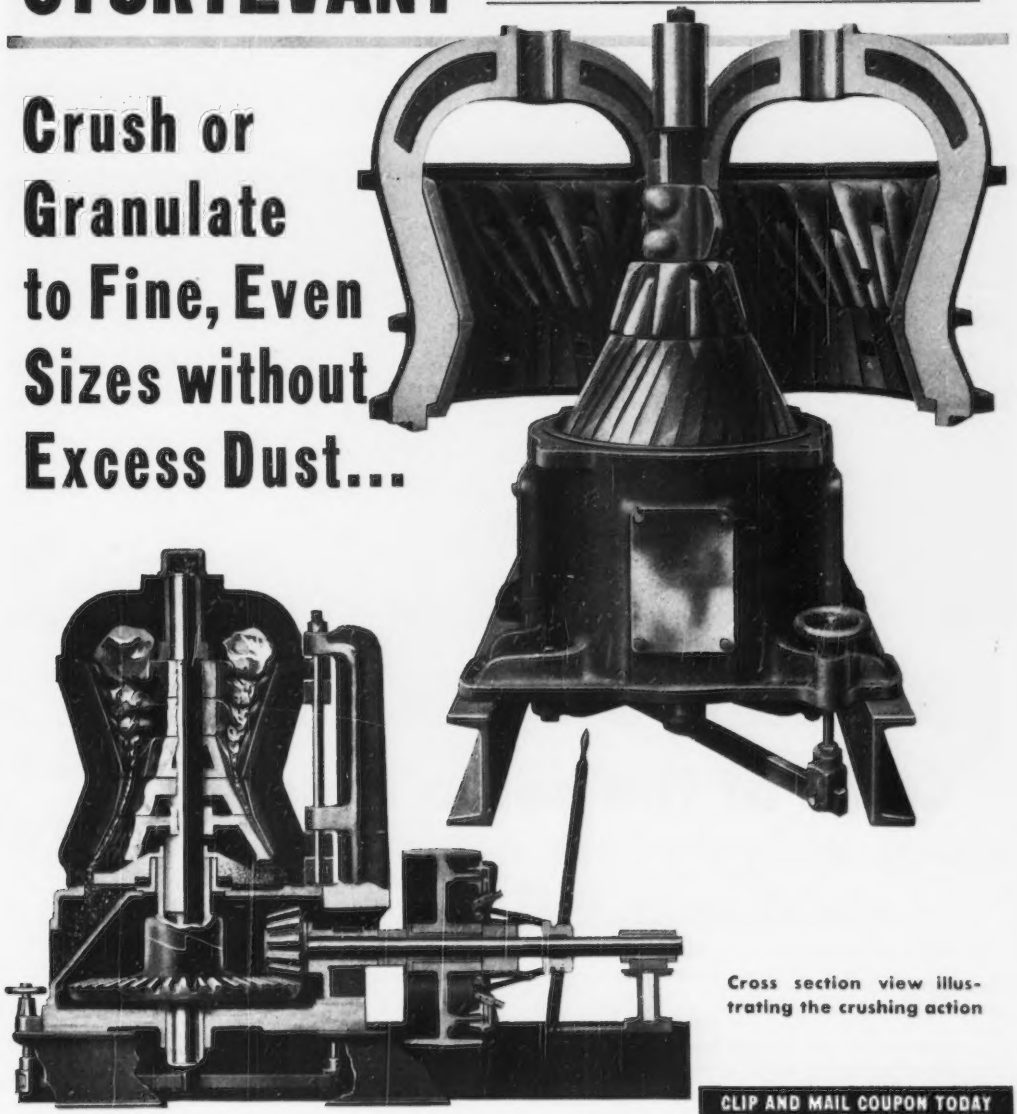
Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

BWH DEPENDABLE RUGGEDNESS

STURTEVANT ROTARY FINE CRUSHERS

Crush or Granulate to Fine, Even Sizes without Excess Dust...



Cross section view illustrating the crushing action

These rugged crushers speed output of fines, cut reduction costs. Desired fineness is quickly obtained by regulating hand wheel. "Open-door" accessibility permits fast, easy cleaning. They crush fine . . . crush fast and do not clog. Available in output capacities from 1 to 30 tons-per-hour. Write for catalog.

STURTEVANT MILL COMPANY
100-A CLAYTON STREET, BOSTON 22, MASSACHUSETTS
Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

CLIP AND MAIL COUPON TODAY

Sturtevant Mill Company
101-A Clayton Street
Boston 22, Massachusetts

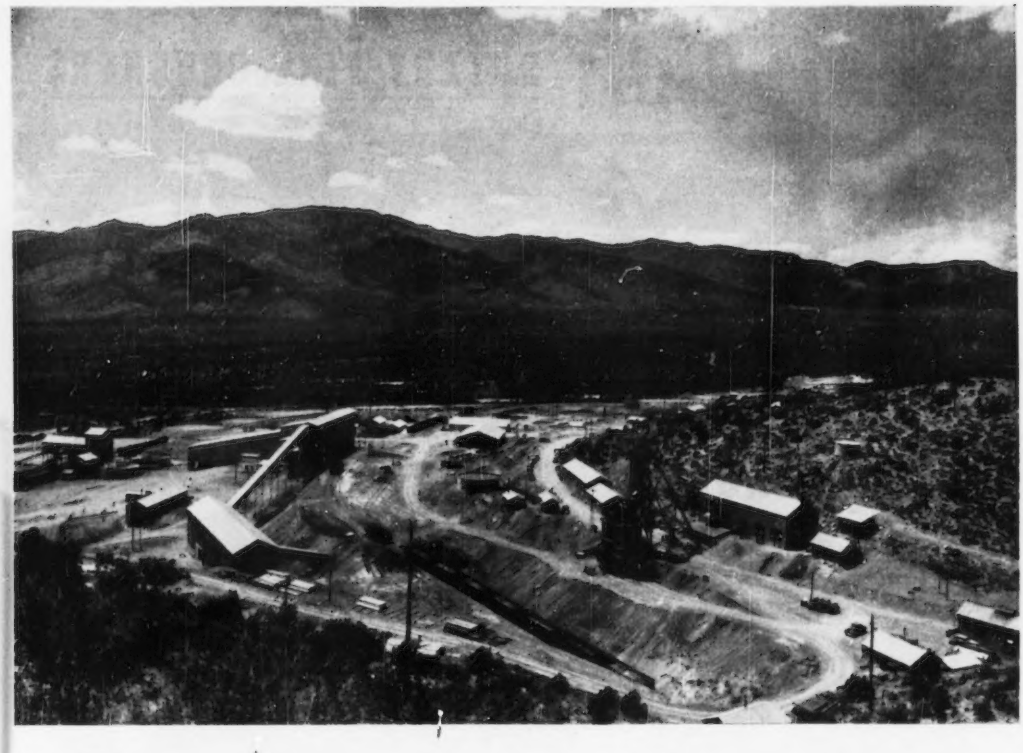
Gentlemen:
Please send me catalog describing your Rotary Fine Crushers. I am interested in crushing_____

*Name*_____

*Street*_____

*City & State*_____

*Firm*_____



Reducing Ore and Handling Costs at the same time

Handling ores through the process of reduction calls for a carefully engineered and equipped conveyor system. The aim is to insure volume movement of materials at the lowest handling cost-per-ton. The S-A belt conveyor system at this mill handles gold, silver, zinc and manganese ores in quantities up to 30,000 tons a month . . . and does a dependable job at low-per-ton cost.

S-A engineers are able to draw on half century of experience with thousands of bulk handling problems and a complete line of equipment units to design and equip conveyor systems. Results show that they combine highest efficiency with greatest economy. Consult with S-A for a low-cost recommendation . . . no obligation.

Ores are shipped to this ore reduction plant by railroad cars from various mines. Ores from the company's own shaft are also processed. An S-A belt conveyor picks up ore from a track hopper and conveys to crushers. Crushed and screened ores are sampled and then conveyed on additional belt conveyors to storage bins.

STEPHEN S-A ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. • Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

B.F.Goodrich

Why you get more recappable tires when you use B.F.Goodrich

IN TOUGH mining and quarry operations like that shown above, mileage doesn't mean much in measuring tire service. Instead, the yardstick is number of hours a tire works and whether or not worn treads can be recapped, or if sharp, jagged rocks cause serious tread cuts.

Reports from B. F. Goodrich users indicate top performance of BFG tires as compared with other brands. For example, one operator reported over 4,500 service hours from B. F. Goodrich *Universals* vs. only 1,600 hours from another make in identical service.

B. F. Goodrich tires stand out in service for many reasons. Tread rubber is specially compounded to resist cutting. More tires can be recapped because they have double bruise protection in the B. F. Goodrich *double nylon shock shield* . . . layers of nylon cord built in between the tread and the body plies.

Only BFG gives you the added protection of the nylon shock shield; the added savings of (1) longer tire life (2) increased bruise resistance (3) less danger of tread separation (4) more recappable tires. But nylon shock shield costs no extra — you pay no premium!

Another "special" is the new ALL-NYLON tire for tough construction projects, quarry work, strip mining, etc. In all tests, not a single BFG All-Nylon tire blew out, not one flex break occurred!

There's a specially designed off-the-road type B. F. Goodrich tire for every need. See your dealer—and on new equipment always specify B. F. Goodrich tires. *The B. F. Goodrich Co., Akron, O.*

DON'T BE SATISFIED WITH HALF-WAY MEASURES...

insist on Walseal® products and be certain

– the FACTORY INSERTED Ring insures FULL PENETRATION of the Silver Alloy . . . a perfect joint

Today, contractors . . . builders . . . architects are using brazed connections, in ever increasing numbers on their brass and copper pipe runs. However, they must be certain that the correct brazing alloy is used; that the joint has penetration of alloy up the shoulder of the fitting.

That's why more and more are turning to Silbraz® joints made with Walseal valves, fittings and flanges which assure the proper amount of alloy with no waste. They know that the finished joint not only will withstand hydrostatic pressure, but it will also withstand terrific impact and vibration – in fact, no correctly made Silbraz joint has ever been known to creep or pull apart under any pressure, shock, vibration or temperature which the pipe itself can withstand.

Furthermore, it is a relatively simple operation to make a Silbraz joint – no heavy scaffolding need be erected . . . just cut the pipe, flux, assemble, then braze, following the technique recommended by the Walworth Company. A silver brazing alloy – FACTORY INSERTED – in each port flows out when heated with the oxyacetylene torch, making a joint that is stronger than the pipe itself . . . a one-hand operation, with the mechanic out of the path of the deflected heat – at all times.

For full information about Silbraz joints made with Walseal products, write for Circular A-1.

WALWORTH

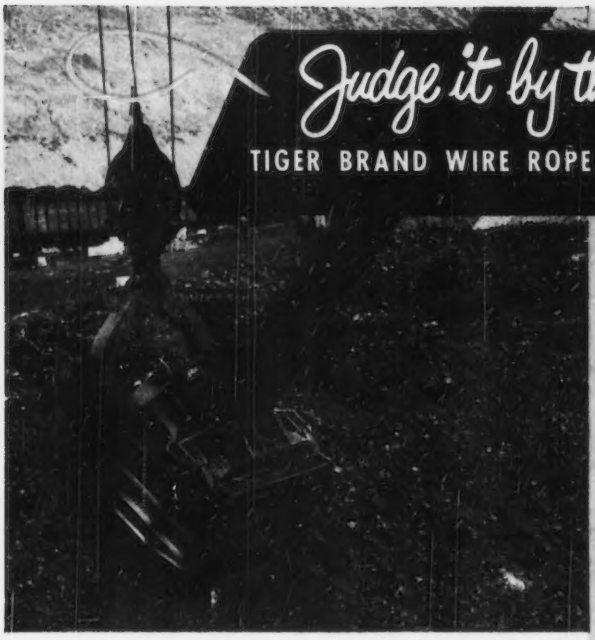
valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Judge it by the jobs it handles

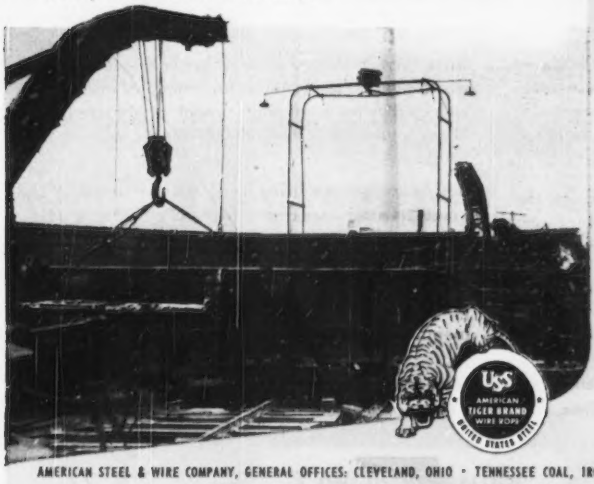
TIGER BRAND WIRE ROPE TACKLES THE HEAVY WORK



Loading coal in 15-ton bites. The Tiger Brand Wire Rope, though inconspicuous in the picture, forms the all-important operating link between coal in the ground and coal in the cars. Tiger Brand is made in all sizes to handle the largest shovels built today.

Retarding conveyor, made with metal disks and strong abrasion-resisting Tiger Brand Wire Rope. Whatever the application you'll find a Tiger Brand Rope designed to do the job at least cost.

Lifting a railroad turntable. This is no job for weak rope. Tiger Brand with Independent Wire Rope Core has greater strength for its size than fiber core rope and is more resistant to abuse.



OUTSTANDING performance month after month in jobs like these proves the superior quality of Tiger Brand Wire Rope. But if you have a special application that's tough on wire rope, call in a Tiger Brand Field Service Engineer. He'll help you select the best rope for your particular needs. In the meantime write for our handbook, "American Tiger Brand Wire Rope."

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO • TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
COLUMBIA STEEL COMPANY, SAN FRANCISCO • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS TRADE MARK

AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

AERO MAPS THE FUTURE!

ONLY a few hundred feet above Canadian bush, an AERO survey crew lowers the sensitive airborne magnetometer into recording position. Swiftly, accurately, economically, it collects the magnetic data to speed future mining development.

In the skilled hands of AERO mapping engineers, the airborne magnetometer is playing an important part in the worldwide search for new mineral resources.

In Canada,* in the Union of South Africa and in the United States, AERO magnetometer surveys covering many thousands of miles have been materially helpful in the selection of areas for further exploration and development. In Canada, for example, information collected by an AERO magnetometer crew was the go-ahead signal for a $25,000,000 mining development program.

Let AERO SERVICE bring its 31 years of mapping and magnetometer experience to your conference table. Whatever your plans may be—mining exploration, industrial development or community expansion—maps by AERO will save you time, money, and manpower. Write AERO today for information about mapping costs and schedules.

**In the Dominion of Canada, aerial mapping-magnetometer surveys are performed by our affiliate, Canadian Aero Service, Ltd., of Ottawa.*

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS
PRECISE AERIAL MOSAICS • AIRBORNE MAGNETOMETER SURVEYS
RELIEF MODELS • COLOR PHOTOGRAPHY

AERO
SERVICE CORPORATION
236 E. COURTLAND ST., PHILA. 20, PA.
Oldest Flying Corporation in the World

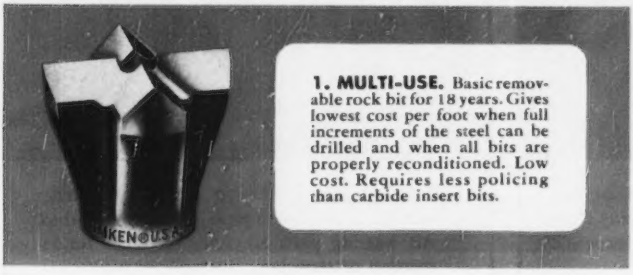
Only TIMKEN® offers all 3 rock bit types...and a complete Rock Bit Engineering Service!

THERE'S one type of rock bit that's best for any particular drilling job—and the Timken® Rock Bit Engineering Service can help you choose it.

Timken Rock Bit Engineers devote themselves exclusively to rock bit problems and have had years of experience in mining, quarrying and construction. And with *all three* rock bit types at their disposal, you can be certain of getting the bit performance that's best for your job, whether it's lowest bit cost, lowest cost per foot of hole, greatest possible drilling speed, or any other desired advantage.

Every Timken Rock Bit is made of Timken electric furnace steel, with uniform hardness for longer wear, better cutting. No matter which type you choose, you are assured of the very best quality.

For help with rock bit problems, contact your nearest Timken Service and Sales office or write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



1. MULTI-USE. Basic removable rock bit for 18 years. Gives lowest cost per foot when full increments of the steel can be drilled and when all bits are properly reconditioned. Low cost. Requires less policing than carbide insert bits.

2. CARBIDE INSERT. For extremely hard and abrasive ground, small holes, extra deep holes. Lets drillers spend more time drilling—less time changing bits. Holes go down faster. Bit reconditioning is simplified.

3. ONE-USE "SPIRALOCK" For use where reconditioning is impractical or undesirable. Offers lowest unit bit cost. New "Spiralock" union holds bit dependably — permits easy removal. Steel preparation simplified.

FREE BOOKLET!

For detailed information on Timken removable rock bits, write on your company letterhead for this complete, new Timken booklet. It shows our full line of rock bits with full information and descriptions. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

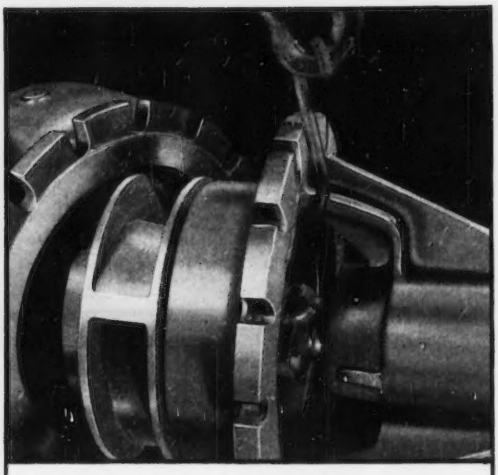
TRADE-MARK REG. U. S. PAT. OFF.

. . . your best bet for the best bit
. . . for every job

Remove Rotating Element in 5 Minutes!

ALLIS-CHALMERS SOLIDS HANDLING PUMP

1. Remove Casing Bolts lift and disconnect drive. Just loosen bolts and bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.



2. Swing Out Rotating Element. Neither suction nor discharge piping need be disturbed. All wearing parts are fully accessible for inspection or servicing.

THE PUMP IS BACK IN SERVICE IN LESS THAN A HALF HOUR

QUICK, EASY SERVICE AND LONG RUNS between servicings are the two things operators want most in solids handling pumps. You can see for yourself how quick and easy service is with an Allis-Chalmers Solids Handling pump.

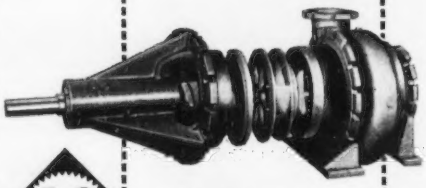
You get long life, too, because Allis-Chalmers Solids Handling Pumps are made of special hard *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know solids handling problems and how to solve them.

Get complete information on Allis-Chalmers Solids Handling pumps from your nearest Allis-Chalmers Sales Office. Or write for Bulletin 08B6381.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

A-3216

Allisite is an Allis-Chalmers trademark.

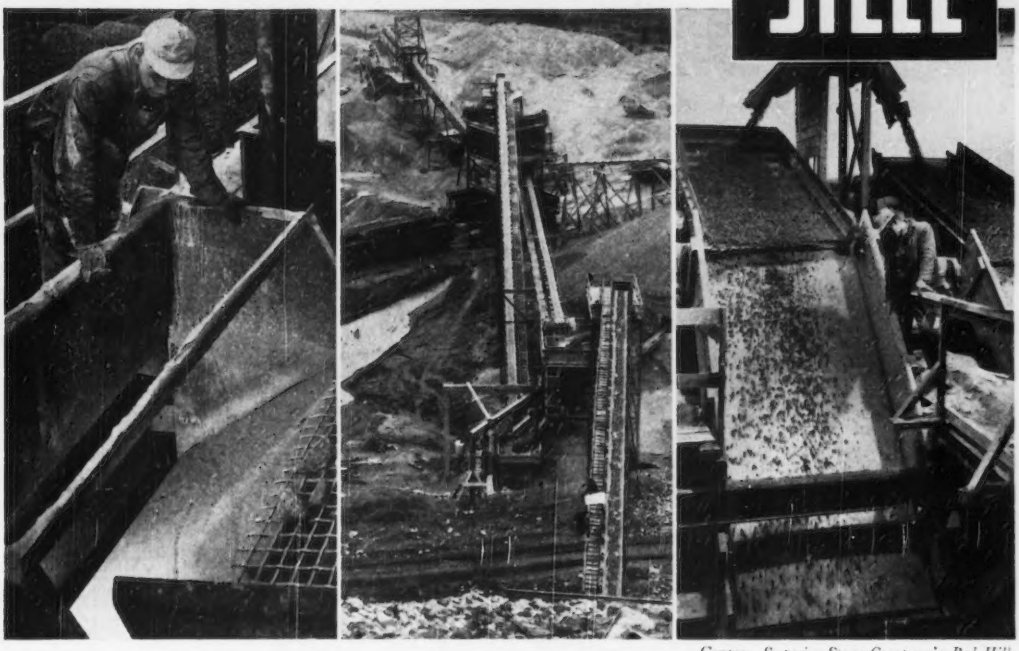


ONLY FIVE WEARING PARTS
Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

ALLIS-CHALMERS

Superior Stone Company Reports
J & L JALLOY Heat-treated Steel
SAVES $200 PER TON installed

J&L STEEL



Center—*Superior Stone Company's Red Hill Quarry, showing screening, crushing and loading units.*

Left and right—*Jalloy heat-treated plates used extensively at Red Hill in chute liners and truck bottoms.*

Heat-treated Jalloy Chute and Truck Liner Plates Give 3 Times Longer Service at Superior's Operations

Superior Stone Company is cutting maintenance costs and increasing service life of equipment by standardizing on J & L JALLOY heat-treated plate for chute and truck body plates.

Typical of Superior's eight operations in Virginia and North Carolina is the large Red Hill, Virginia, quarry. Records at Red Hill show that J & L heat-treated Jalloy has a service life *generally three times longer than mild steel.* This means that for every ton of heat-treated Jalloy Superior Stone Company uses to replace mild steel, $140.00 is saved in cost of steel and $60.00 is saved in man hours spent for maintenance of chutes and truck bodies. **A total savings of $200 per ton of Jalloy installed.**

The result—J & L Jalloy is now installed as side and bottom liners in all chutes at Red Hill Quarry, in truck bodies and in several other miscellaneous applications.

Manufacturers and maintenance men alike have found that a yield strength 4 times that of mild steel and a Brinell hardness 4 times as great make heat-treated Jalloy an ideal steel for use in such applications as—Bulldozers—Scrapers—Rock Crushers—Shovel Buckets—Dump Cars—Truck Bodies—Chutes and Sand Blast Equipment.

If abrasion and impact are limiting the life of your equipment and causing high maintenance costs—why not write for the booklet, "For Longer Wear, Less Repair"? It will give you the facts on J & L heat-treated Jalloy and how others are saving money with this modern mining and quarrying steel.

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building
Pittsburgh 30, Pa.
Please send me a free copy of your booklet, "For Longer Wear, Less Repair—Jalloy—J & L Special Alloy Steel."

Name_____

Company_____

Address_____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

He's safe. In either open pit or underground mines, the Westinghouse Ground Fault Protector, mounted at lower left on the auxiliary transformer skid, prevents injury to men and damage to machinery.

Westinghouse

EQUIPMENT FOR THE MINING INDUSTRY

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

DOES YOUR MINE HAVE ADEQUATE GROUND FAULT PROTECTION?

IT PREVENTS INJURY, SPOTLIGHTS TROUBLE

Unprotected ground faults are dangerous. They can gravely injure men who touch equipment served by a faulted feeder. They result from electrical troubles that can damage machinery and cause shutdowns. Ask yourself two questions: Are the high-voltage circuits that supply your shovels or draglines adequately protected? Are you overlooking the danger in *auxiliary* circuits that serve drills, pumps, etc.? If you're in doubt, your Westinghouse representative can be a big help.

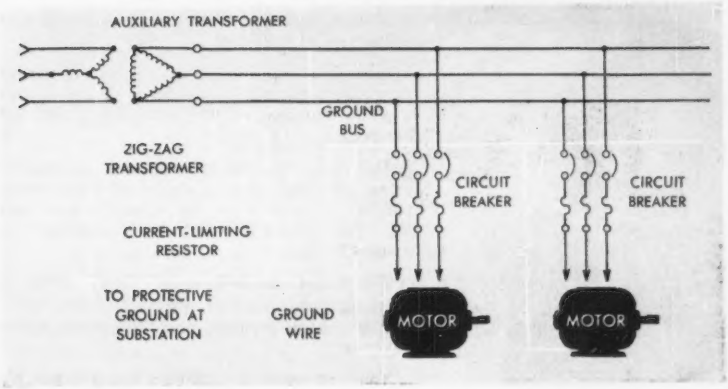
NOW—AUXILIARY CIRCUIT PROTECTION

Westinghouse has supplied high-voltage protective equipment for many years. Now, in answer to industry requests, Westinghouse offers a Ground Fault Protector for *auxiliary* circuits. This Protector is low in cost and easy to install. You bolt it to the auxiliary transformer skid and make simple electrical connections. When a fault occurs, the equipment served is immediately isolated. The trouble is then located, corrected and operation resumed. Men and machinery are safe.

HAVE WESTINGHOUSE CHECK YOUR SYSTEM

Call your Westinghouse office and have an engineer *make sure* your high-voltage protective system is adequate. Then have him tell you more about Westinghouse protection for auxiliary circuits. It's good business insurance. J-94850

HERE'S HOW THE AUXILIARY PROTECTOR PREVENTS INJURY



The frame of each of the motors, driving pumps, drills, etc., is connected to the ground wire (white line). If the current in the ground wire exceeds a predetermined safe amount, the circuit breakers serving the affected motors will trip. The faulted section is thus safely isolated and exposed as a trouble spot.

GET MORE INFORMATION NOW ON GROUND FAULT PROTECTION

Westinghouse Electric Corp.
P. O. Box 868
Pittsburgh 30, Pa.

Gentlemen:

Please send me without obligation the following information:

- ☐ Folder B-4747, Ground Fault Protection for Auxiliary Power Circuits in Open Pit Mines and Quarries.
- ☐ Booklet B-3282A, Electric Power Distribution and Protection for Open Pit Mines.

Name_____ Title_____

Address_____

DUCHESNE TUNNEL EXTENSION

Replacing old wood sets with steel and driving the remainder of a water supply tunnel started before World War II is the tough assignment drawn by the contracting firms of Grafe Callahan Construction Company and Rhodes Bros. & Schofner.

The tunnel is now advanced to approximately 17,000 ft. and steel is still being carried to within a few sets of the face.

In spite of the difficulties involved Superintendent Ray Blasongame has been able to maintain a daily average of 42' advance in this 10'9" heading.

The mucking time is kept to a minimum by using a special narrow Model 40 Eimco Rocker-Shovel. Cars of 4 cu. yd. capacity are loaded full. The passing switch is "California" type using 45# steel.

The Superintendent says: "They're the best mucking machines I've ever seen. We run 'em at 135 pounds pressure and they really bale out the muck."

You can depend on Eimco Equipment. Write for full details.

(Above) Operator Leon LeFerie on Model 40 Rocker-Shovel. (Inset) r. to l., Merl C. Miller, Master Mechanic, W. Roberts, Shifter, and R. C. Blasongame, Supt. (Below) Special model 40 and 4 yard cars pass on California switch.

A274

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
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EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIFORNIA, P. O. BOX 240
KELLOGG, IDAHO, 315 MAPLE STREET

AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

Firestone TIRES

TIRES used in rock work, strip mining, and earth moving have to face a terrific amount of torture. Whether they make or lose money depends on how *well* and how *long* they can take that torture.

Firestone tires can TAKE it. Time and again they break old performance records, set new records for long service. Such performance is no accident. The extra tough, job-designed treads and the all-rayon Gum-Dipped cord bodies — protected by four extra impact plies and extra-thick sidewalls — explain why Firestone tires turn in *better* work and turn out *more* work.

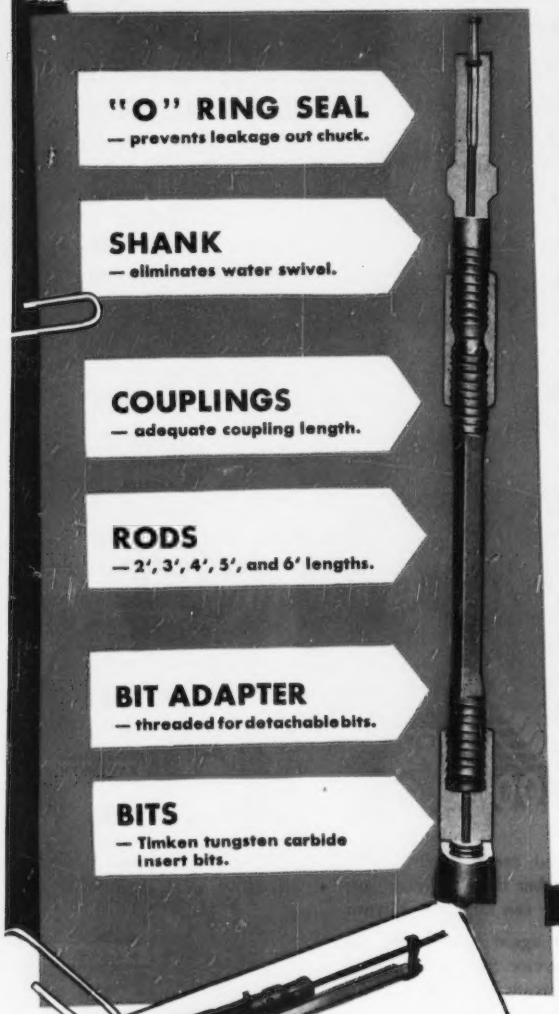
Not far from your project there's a Firestone Dealer or Store organization prepared to handle your complete tire needs and lower your operating cost. They will welcome the opportunity to call on you and show how this can be done.

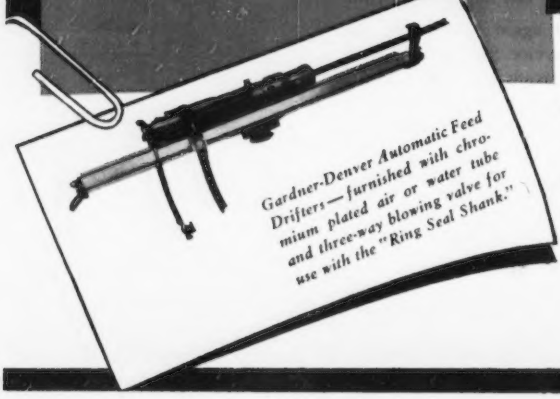
WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES SPECIFY FIRESTONE OFF-THE-HIGHWAY TIRES

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

Copyright, 1950, The Firestone Tire & Rubber Co.

TODAY'S BIGGEST NEWS IN DEEP HOLE DRILLING




Gardner-Denver Automatic Feed Drifters — furnished with chromium plated air or water tube and three-way blowing valve for use with the "Ring Seal Shank."

GARDNER-DENVER DEEP HOLE DRILLING EQUIPMENT WITH "RING SEAL SHANK"

Here's a whole new set of field-proved drilling equipment that will revolutionize your deep hole drilling. Now, for the first time, you can take full advantage of tungsten carbide insert bits and modern rock drill power for faster, lower cost deep hole drilling.

No more water swivel troubles

The new Gardner-Denver "Ring Seal Shank" replaces the old type water swivel at a fraction of the cost — eliminates water swivel troubles.

Higher blowing pressures

"Ring Seal Shank" delivers high pressure water or air into the drill rods — assures positive hole cleaning.

Longer rod and coupling life

Gardner-Denver sectional rods and couplings withstand the shock and grind of deep hole drilling — last much longer than conventional equipment — because they're manufactured with the same skill and precision as rock drill parts. Rod design has been carefully engineered to minimize stress concentrations and to form a tight union between all parts.

Tested and proved in the field

Gardner-Denver deep hole drilling equipment has been widely field tested — is now in use in many United States and Canadian mines — drills prospect holes at a fraction of the cost of diamond drilling.

Write today for complete information.

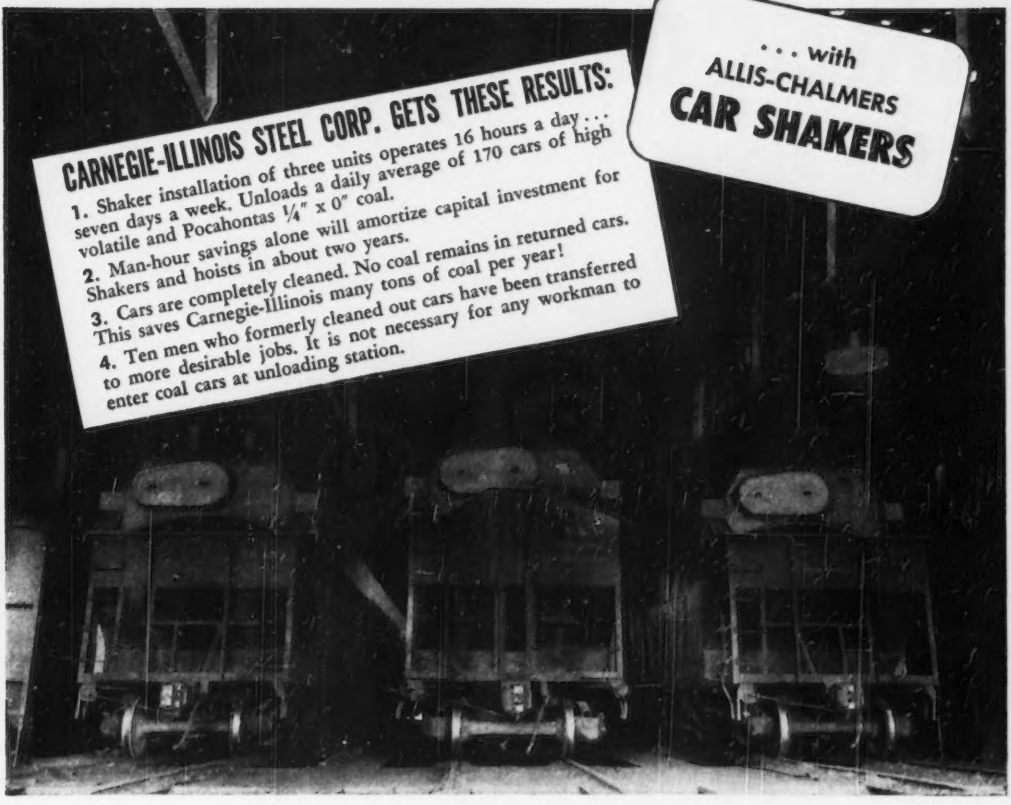
GARDNER-DENVER

Since 1859

Gardner-Denver Company, Quincy, Illinois.

In Canada:
Gardner-Denver Company (Canada) Ltd., Toronto, Ontario.

STEEL MILL UNLOADS
170 Coal Cars Daily!


CARNEGIE-ILLINOIS STEEL CORP. GETS THESE RESULTS:
1. Shaker installation of three units operates 16 hours a day . . . seven days a week. Unloads a daily average of 170 cars of high volatile and Pocahontas ¼" x 0" coal.
2. Man-hour savings alone will amortize capital investment for Shakers and hoists in about two years.
3. Cars are completely cleaned. No coal remains in returned cars. This saves Carnegie-Illinois many tons of coal per year!
4. Ten men who formerly cleaned out cars have been transferred to more desirable jobs. It is not necessary for any workman to enter coal cars at unloading station.
. . . with
ALLIS-CHALMERS
CAR SHAKERS

YOU CAN GET SIMILAR SAVINGS in demurrage charges and man-hours by installing an Allis-Chalmers Car Shaker. And you save with safety! Accidents are eliminated as workmen do not have to mount the car during the automatic unloading operation.

The Shaker is driven by a 15 hp, high torque, integrally enclosed Allis-Chalmers motor — mounted on rubber to protect motor from severe vibration.

For complete information on how the Car Shaker can help *you* save time and money, contact your nearby A-C Sales Office. Or write for Bulletin 07B7221.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

Please send Car Shaker Bulletin 07B7221.

Name .....

Title .....

Firm .....

Address A-3171

ALLIS-CHALMERS

Look for the name AMSCO® on the dipper you specify...

Amsco Engineering — plus Amsco Manganese Steel Construction — means more efficient, more profitable shovel operation.

Profit is determined by *handling costs per yard,* and here are 2 important reasons why you can lower those handling costs with AMSCO Dippers:

Austenitic Manganese Steel—For Longer Life— The more you use an Amsco dipper, made of manganese steel throughout, the harder it gets! Surfaces that are subject to impact and abrasion actually work-harden and take on a high polish for added wear-resistance.

Manganese Steel—"the toughest steel known"—withstands the most severe breaking stresses.

AMSCO Engineering—For Better Operation— Years of Amsco design experience bring you a *complete line,* from which you can select dippers "custom-engineered" to your own requirements . . . for deep penetration, full loading and positive dumping. Whether you need manganese steel Welded, Missabe, Renewable Lip types, or special designs for unusual service, *you'll get longer wearing life and greater economy when you specify Amsco.*

NOW! Prompt delivery of Amsco Dippers and Parts

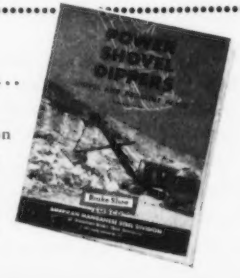
AMSCO®
WELDING PRODUCTS

The fast, low-cost way to get worn or damaged equipment back in service.

Amsco hardfacing rods make important on-the-job savings . . . keep down time at a minimum. Contact your supply house or Amsco representative for information on the complete Amsco line of Welding Rod, Weldments and Repointer Bars.

Get the facts on the complete Amsco Line...

This 40-Page booklet is packed with information on Amsco Dippers, and parts for shovels and draglines. Write today for your free copy . . . ask for Bulletin No. 547 DS.



AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
376 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT
This is the Coppus VENTAIR. A centrifugal blower, it is designed for long pipe lines, high pressures.
This is the Coppus VANO. The propeller-type, best for shorter pipe lines, medium pressures.

These are the cost-reducing Blowers that give up to 100% more air

Only Coppus makes both types — and both are made especially for *mine* ventilation. One or the other, operating under the conditions for which it is designed, delivers from 30% to 100% more air for a given power consumption than an ordinary all-purpose fan.

They can be used as blowers or exhausters and are driven either by compressed air or electric motor, with capacities up to 90,000 CFM. Like all Coppus products, these blowers wear the "Blue Ribbon" that stands for high achievement in engineering, workmanship and performance.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corp., Worcester 2, Mass.

COPPUS ENGINEERING CORPORATION
292 Park Avenue, Worcester 2, Mass.

Please send.....Bulletin 130

Name .....

Company .....

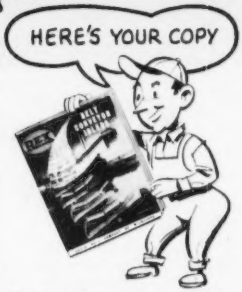
Address .....

A LONGER RUN FOR YOUR MONEY!

Rex Idlers are built to last. Triple labyrinth grease seal . . . tapered roller bearings . . . extra large grease reservoir . . . these are a few of the Rex advantages that mean longer life for idlers, belts and machinery parts. Even if just one idler "freezes up," the belt can wear through the roll shell in a matter of hours, leaving knife-like edges to cut the belt. Rex Idlers are fully greased at the factory and will operate for long periods even without minimum maintenance. But Rex Idlers, or any other make, will give far longer service if minimum maintenance rules are followed. The fact that many Rex Idlers are still going strong after more than 25 years of service is, we believe, proof of the pudding.

Idlers, belts and machinery parts should be inspected periodically, depending upon amount of use. Greasing and servicing should be done as indicated by inspection. (Normally, 1000 operating hours is the average greasing period). Inspection should include the following checks:

1 All rolls turning freely and smoothly, with no excessive bearing end play.
2 All rolls properly seated in brackets.
3 No unusual damage to rolls, brackets or base.
4 Evidence of adequate greasing at seals but no excessive amount. Don't overgrease.
5 Check for accumulation of material under rolls. Keep deck plates clean.
6 No buildup of material on return rolls.
7 Grease pipes and fittings in good usable condition. No broken pipes or missing fittings.
8 Belt running true and self-aligning idlers operating freely.

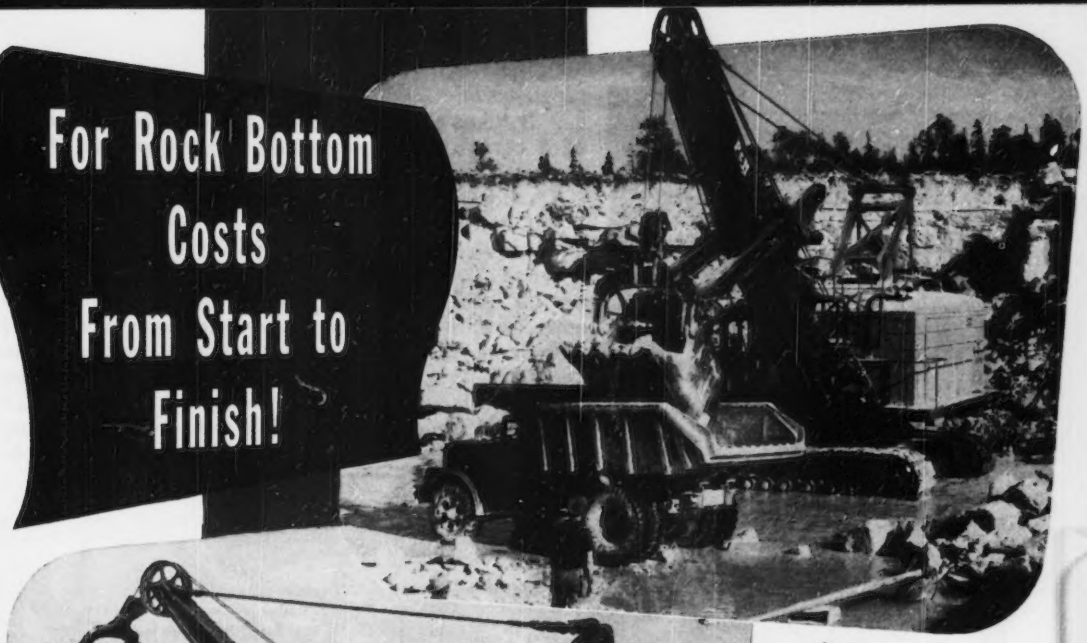


You'll find it pays to follow these tips. For more detailed information on idler care, approved idler greases, and for all the facts on the complete Chain Belt Idler line, send for Bulletin 463-R. Chain Belt Company, 1679 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

BELT CONVEYOR IDLERS

For Rock Bottom Costs From Start to Finish!



START . . . FLUXING STONE
A P&H Model 1400 Diesel-Electric (4 yd.) shovel, owned by Drummond Dolomite Inc. at Drummond Island, Michigan.

FINISH . . . BLAST FURNACE SLAG
A P&H Model 1400 Diesel-Electric shovel owned by the Buffalo Slag Co., Buffalo, New York.

P&H DIESEL-ELECTRIC SHOVELS

with *MAGNETORQUE** HOIST DRIVE

Now, you can have electric shovel efficiency *anywhere* with a P&H Diesel-Electric quarry and mining shovel. It's a complete electric shovel . . . with the addition of a diesel engine to furnish power . . . entirely independent of high line service.

Years of the toughest rock digging have proved the P&H Diesel-Electric from every standpoint . . . dependable operation . . . less maintenance . . . rock bottom tonnage costs.

This simplified P&H Diesel-Electric shovel is made possible by the exclusive P&H Magnetorque Hoist Drive. Hoist generator, hoist motor, slip friction clutch and other mechanical devices are completely eliminated. Magnetorque is only one of many P&H Added Values. Ask for Bulletin X83-DE.

Every Third P&H Electric Shovel Sold is a Repeat Order.

P&H **ELECTRIC SHOVELS**
4454 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch

It certainly takes POWER to Grind Ore

and it's best done in a MARCY Mill

It takes a certain amount of power to grind a ton of a certain ore to a certain size, regardless of mill design. The more power utilized by a mill, the greater the capacity or the finer the grinding. Size for size, MARCY Mills will grind more ore than other types because they utilize the maximum of power and utilize it efficiently. Their low pulp line permits greater impact of the grinding media, quicker removal of finished material with a minimum of overgrinding, and a higher pulp density for better contact between grinding media and ore. This means less floor space, power, and operating labor for a plant equipped with MARCY Mills. That is why MARCY Mills are found in so many grinding plants throughout the world, particularly in large installations.

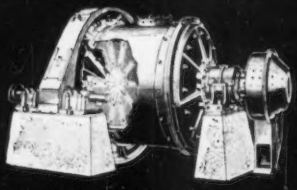
MARCY Open-End Rod Mills, pioneers in fine crushing or coarse grinding—Application of MARCY Open-End Rod Mills to take a coarse feed and, in one pass through the mill, prepare a fine product for the regrind mills is not new. They were doing this in 1919. To the right are a few of the early installations on this work.

As time went on, selective flotation replaced gravity concentration and changed flowsheets for the time being, but MARCY Open-End Rod Mills pioneered in single pass grinding, just as MARCY Ball Mills pioneered in major grinding developments since 1914.

A Few Early Installations	Date
3 Phelps Dodge plants	1919-1920
Cia. Minera Beneficiadora de Inde	1921
The Fresnillo Company	1920
Southwestern Graphite Company	1923
Cerro de Pasco	1925
Hollinger Cons. Gold Mines	1923
Neg. Minera de La Mazata	1923
S. F. Mines of Mexico, Ltd.	1925
Bertha Mineral Company	1926
Cia. Minera de Penoles	1926

MARCY BALL MILLS Since 1914 have been world-wide choice for many plants. One of the companies listed (right) recently placed with us the largest single order for grinding equipment ever bought for any plant from any manufacturer! Repeat orders tell the worth of equipment, and many of the companies listed to the right, as well as others not shown, have placed successive orders for MARCY Ball Mills.

- Phelps Dodge Corporation
- Chile Exploration Co.
- American Smelting & Refining Co.
- U. S. Smelting, Refining & Mining Co.
- Kennecott Copper Corporation
- Climax Molybdenum Co.
- American Metals Co.
- Newmont Mining Co.



OTHER PRODUCTS

Massco Fahrenwald Flotation Machines; Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Density Controllers; Belt Feeders; Rubber Pinch Valves; Assay and Laboratory Supplies and Equipment; Complete Milling Plants.

CONTACT YOUR NEAREST MASSCO OFFICE

Main Office: DENVER, COLO., U. S. A.; El Paso; Salt Lake City; 1775 Broadway, New York, N. Y. Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P. I.; The Ore & Chemical Corp., 80 Broad St., New York 4, N. Y., for Continental Europe.

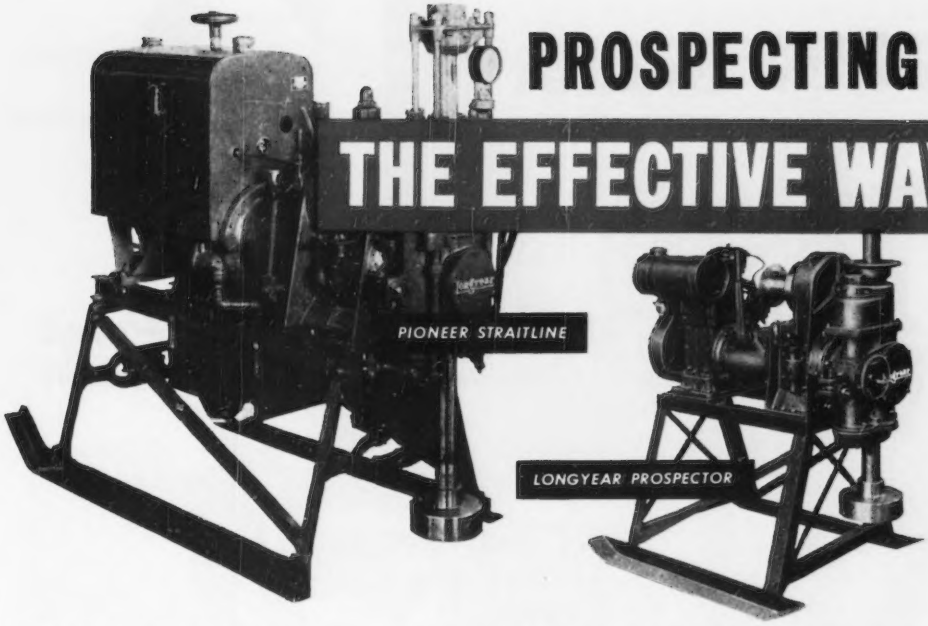
For over a third of a century, MARCY Mills have been designed and built from experience and specialization in grinding. Qualified, experienced engineers and extensive field and test data assist in the selection of the proper size and type MARCY Mill for your grinding requirements. MARCY Mills assure you of appreciable savings due to . . .

These Features	with	These Results
Low Pulp Line		Increased Tonnage, Lower Per-Ton Costs
Larger Discharge Opening		Quicker Removal of Finished Product
Rapid Circulation of Mill Contents		Minimum of Overgrinding
Minimum Cushioning of Grinding Medium		Higher Pulp Density, Greater Efficiency
Greater Impact Drop		Improved Metallurgy in Many Flowsheets

Our world-wide metallurgical experience is at your service without cost or obligation. Ask for complete information.

The Mine & Smelter SUPPLY COMPANY

PROSPECTING..
THE EFFECTIVE WAY



YOUR BEST METHOD is core drilling. A given area may be rapidly and economically tested, core samples recovered, mineral values determined . . . Cores tell the story!

YOUR BEST DRILLS for shallow to moderate depth drilling are the Longyear Prospector and Pioneer Straitline. Their practical advantages include:

- MOBILITY—Conveniently transported to remote districts by plane, or "broken-down" for pack horse or canoe. They are easy to move in the field.
- DEPENDABILITY—Design and sturdy construction assures continuous, trouble-free operation. That means more feet per shift.
- ECONOMY—Fuel consumption and operating costs are low. Reduced diamond loss results from smooth power-flow to bit.

YOUR CHOICE OF PROSPECTOR OR PIONEER DEPENDS ON DRILLING CAPACITY REQUIRED

DRILL CAPACITIES— The depth of holes to be drilled will govern largely the selection of your drill. The Longyear Prospector, capacity 300′ of ⅞″ core, and the Longyear Pioneer Straitline, capacity 600′ of ⅞″ core, are illustrated and fully described in bulletins No. 73 and No. 69 respectively. Write for them.

CORE DRILLS AND SUPPLIES— Longyear manufactures a complete line of core drills—large or small, for surface or underground use. There is a quality-built model to suit your job.

Also, quality-built diamond drill accessories and standard supplies are available from stock.

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A. NEW YORK OFFICE, 1775 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

New model K

Centrifugal Sand Pump

ENGINEERED FOR GREATER PUMPING ECONOMY

PATENTED

The new WILFLEY Model K Centrifugal Sand Pump features important mechanical improvements which give you substantial dollar savings—in power and production. This new pump delivers continuous, trouble-free operation—stepped-up production—dependable performance in handling sands, slimes or slurries. Individual engineering on every application—an economical size for every requirement. Write or wire for details.

Write for Wilfley Bulletin which details the special features, capacities, dimensions and other pertinent information.

BUY WILFLEY FOR COST-SAVING PERFORMANCE

WILFLEY
centrifugal PUMPS

A. R. WILFLEY & SONS, INC.
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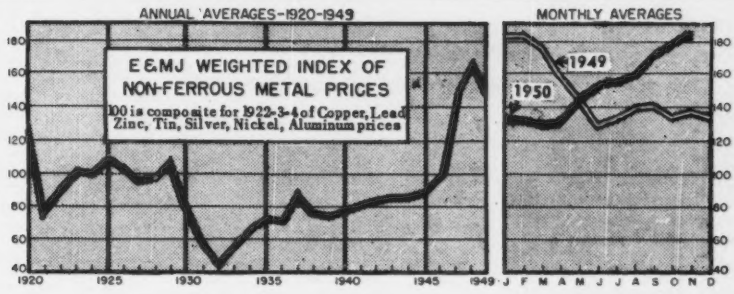
New York Office: 1775 Broadway, New York City

E&MJ OUTLOOK

PRICES



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MARKETS

The E & MJ index of non-ferrous metal prices climbed to a new record in November at 186.00 The old mark was 185.75, reached in February, 1949. November's rise was foreshadowed by advances in lead, foreign silver, and tin that occurred late in October. Tin set an all-time high of $1.55 a lb., E & MJ, quotation, early in the month.

Unsatisfied demand for all major metals runs strong, although tension in metal markets eased a little as November ended. Producers hoped that NPA's directives limiting civilian use of copper and zinc (after Jan. 1, 1951) would help curb current hysterical buying of metals.

●

LABOR

U. S. Steel's 16 to 18c. an hour wage increase for the CIO Steelworkers put metal mining's Mine, Mill union on the spot. Its leaders, marked as Communist sympathizers, would rather lie low just now, but a wage drive may be forced on them next spring to try to equal the Steelworkers' gains.

●

AT HOME

The prospect, as November ended, was as dark as the weather over much of the United States. But come peace or war, metal mining can be sure of two things: First is a continuing and eager demand for its products; second is a continuing and growing shortage of manpower to mine them.

Shifts from civilian to defense production may ease manpower shortages locally, but any such relief will be only temporary.

Plans are on foot for several large-scale mining projects to be financed in whole or in part with Government funds. Applications already received probably total more than the $600,000,000 available for any expansion of defense activities that private industry can't handle alone. Note the RFC loan for a new Miami Copper project in Arizona (See p. 129).

Although metal control orders issued thus far do not prohibit nonessential uses of metal, some form of end-use control is in prospect. A kind of controlled-materials plan might be set up by next summer.

●

ABROAD

Philippine mining would get a strong lift out of the $250,000,000 aid program proposed by the Bell report. Iron ore, pyrite, phosphate, and sulphur would get most attention. Bell also urged the Philippine government to take steps to attract more foreign venture capital.

There's talk of going after **the Goiaz nickel deposits** in Brazil once more. A. S. & R. tried some years ago, but gave it up.

N'Changa plans to expand capacity to 108,000 long tons of copper annually by 1953. It will cost them about $16,000,000.

The tin meeting (See p. 151) at Geneva broke up in a deadlock. The U. S. itch to stockpile tin was the chief stumbling block.

MARKETS—Trends and Prices

NPA Orders to Restrict Non-Military Use of Copper, Cobalt and Aluminum — Tin Higher

DEMAND FOR MAJOR non-ferrous metals continued well in excess of the available supply throughout November. Purchasing agents, as a group, lowered their sights a little because (1) they tired of asking for metal that was not available, and (2) limitations on use in the critical items will come into play at an early date. Defense orders were more numerous, but tonnages involved on such business were hardly weighty enough to cause all of the confusion that has come into the market. Protective buying on the part of the ultimate consumer continued to upset all calculations on probable demand made by primary producers and fabricators. Until credit curbs and other restrictions cut more deeply into the available supply of finished products, the buying movement in civilian goods is expected to remain high.

The trend in prices was upward. Producers were compelled to ignore the fantastic prices paid for copper and zinc in the so-called outside market. Sharply higher prices, it was generally maintained, would only bring about price control by the Government. The tonnages sold in the outside market at premium prices have been relatively small and restricted largely to dealer business.

The E & MJ index of non-ferrous metal prices moved up to 186.00 in November, against 179.83 in October and 154.30 in June.

During November the National Production Authority issued orders limiting the use of copper, cobalt and aluminum in the civilian economy. Orders providing for the equitable distribution of defense orders came through in copper, cobalt, aluminum and zinc.

The cutback in copper, under order M-12, limits production and use of brass mill and wire mill products by total weight to 85% during January and February and to 80% in March of the average quarterly production and use in the first half of 1950.

Aluminum order M-7 was designed to keep civilian use of the metal to within 65% of the quantity consumed in the first six months of the current year.

"DO" business in cobalt is to be filled during December to the extent of 60% of the quantities ordered. Unrated orders for cobalt may be filled by delivering 50% of the average monthly quantity received by the consumer in the first six months of 1950.

Order M-9 governing acceptance of "DO" orders in zinc provides that producers will not be asked to accept in any one month more than 10% of output on such orders.

Limitations on use are under consideration in zinc, tungsten, cadmium and manganese.

Copper Strong at 24½c.

Though mine output of copper has increased moderately in recent months, the over-all supply situation remains as tight as ever. Sales by producers during November amounted to about 100,000 tons, all of which was booked at either 24½c., delivered, or on an average price basis. The undertone remains strong, but there was no move among first hands to disturb the quotation under prevailing strained conditions.

The supply situation in the foreign division of the copper market was much the same as here. Consumers complained that they have been unable to purchase copper at the established quotation of 24½c., f.a.s. New York, but the fact remains that substantial tonnages are being moved regularly on this basis.

A summary of the latest statistics of Copper Institute, in tons, follows:

United States

Production:	(a)Sept.	Oct.
Crude, primary	80,102	83,689
Crude secondary	6,576	7,610
Totals	86,678	91,299
Refined copper	111,842	110,435
Deliveries, refined	119,529	121,806
Stocks at end, refined	58,748	56,945

Outside United States

Production:	(a)Sept.	Oct.
Crude, primary	105,798	119,441
Crude, secondary	616	517
Totals	106,414	119,958
Refined copper	93,507	105,237
Deliveries, refined	85,809	77,502
Stocks at end, refined	133,379	135,712

(a)Corrected.

A three-weeks' strike at the Tacoma refinery of A.S. & R. Co. was settled late in the month and casting operations will be resumed early in December. The new electrolytic copper refinery at Garfield, constructed by Kennecott at a cost of $16,000,000, was dedicated Nov. 15. Output of the refinery in November was estimated at 10,500 tons.

Premiums on special shapes have been raised about 20% by the American Metal Co. and A.S. & R. Co.

Lead Consumption Up

Even though lead appears to occupy a far better position under the defense program than most other metals, consumers again took no chances and bought freely. The recent rise to 17c. per pound, New York, failed to check the buying movement. Export business was noted at 17½c. and 18c., f.a.s. Gulf ports.

An indication of what undoubtedly has happened in most commodities is clearly visible in the August statistics on consumption of primary and secondary lead in the United States. Figures compiled by the Bureau of Mines show that use of lead increased from 93,300 tons in July to 126,035 tons in August.

Zinc Shortage Acute

Use of zinc has been reduced by several galvanizers because of the shortage in supplies. The tight situation is expected to continue for an indefinite period. Prices named by producers were unchanged on the basis of 17½c. for Prime Western, East St. Louis. In the foreign market 22c. per pound was paid on the common grade, f.a.s. Gulf ports.

Average Prices for November (E&MJ Quotations)

Copper:	
Electrolytic, Domestic, Refinery	24.200
Electrolytic, Export, Refinery	24.425
Lead:	
Common, New York	17.000
Common, St. Louis	16.800
Silver and Sterling Exchange:	
Silver, New York, per oz.	80.000
Silver, London, pence per oz.	70.000
Sterling Exchange, "Checks"	280.000
Zinc:	
Prime Western, East St. Louis	17.500
Tin:	
New York Straits	137.217
New York, 99% min. (e)	136.217
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$99.348
Antimony (E&MJ) (d)	35.280
Antimony, bulk, Laredo	32.000
Antimony, in cases, Laredo	32.500
Platinum, refined, per oz.	$90.000
Cadmium (a)	240.000
Cadmium (b)	252.500
Cadmium (c)	265.000
Aluminum, 99% plus, ingot	19.000
Magnesium, ingot	24.500
Nickel (f)	48.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F.o.b. Port Colborne, U. S. duty included.

American Zinc Sales Co. will raise its premium on High Grade and Special High Grade zinc $5 per ton, effective Jan. 1, 1951, owing to higher delivery costs. Other producers in all probability will follow.

Production of slab zinc in the United States in October totaled 79,997 tons; deliveries totaled 81,156 tons; stocks declined to 9,108 tons.

Silver of foreign origin held at 80c. an ounce troy, New York.

Tin established new highs on continued nervousness over developments in the Far East. The market has narrowed down considerably because of stockpiling, foreign traders contend. The attempt to establish an international control plan under United Nations auspices failed.

Tungsten ore of good quality was quotable as November ended at $34 to $35 per short ton unit of WO_3 in bond. Domestic scheelite advanced to $40.

Indian manganese ore advanced to 88c. and upward, c.i.f. U.S. ports.

Quicksilver was advanced by the Spanish producer to $100 per flask, f.o.b. port of shipment, equivalent to $122.50 per flask, New York, duty paid.

(*Continued on page* 103)

Major Metals

U. S. DAILY AND AVERAGE PRICES

	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
Nov., 1950						
1	24.200	24.425	127.000	17.000	16.800	17.500
2	24.200	24.425	132.000	17.000	16.800	17.500
3	24.200	24.425	136.000	17.000	16.800	17.500
4	No Market	24.425	136.000	17.000	16.800	17.500
6	24.200	24.425	151.000	17.000	16.800	17.500
7	Holiday	24.425	Holiday	Holiday	Holiday	Holiday
8	24.200	24.425	155.000	17.000	16.800	17.500
9	24.200	24.425	138.000	17.000	16.800	17.500
10	24.200	24.425	130.000	17.000	16.800	17.500
11	No Market	24.425	Holiday	Holiday	Holiday	Holiday
13	24.200	24.425	138.000	17.000	16.800	17.500
14	24.200	24.425	137.500	17.000	16.800	17.500
15	24.200	24.425	136.000	17.000	16.800	17.500
16	24.200	24.425	132.000	17.000	16.800	17.500
17	24.200	24.425	132.000	17.000	16.800	17.500
18	No Market	24.425	132.000	17.000	16.800	17.500
20	24.200	24.425	136.500	17.000	16.800	17.500
21	24.200	24.425	144.000	17.000	16.800	17.500
22	24.200	24.425	138.500	17.000	16.800	17.500
23	Holiday	24.425	Holiday	Holiday	Holiday	Holiday
24	24.200	24.425	135.000	17.000	16.800	17.500
25	No Market	24.425	132.000	17.000	16.800	17.500
27	24.200	24.425	131.000	17.000	16.800	17.500
28	24.200	24.425	140.500	17.000	16.800	17.500
29	24.200	24.425	146.000	17.000	16.800	17.500
30	24.200	24.425	140.000	17.000	16.800	17.500
AVERAGES FOR MONTH						
Nov.	24.200	24.425	137.217	17.000	16.800	17.500
AVERAGES FOR WEEK						
Nov.						
1	24.200	24.425	123.167	16.333	16.133	17.500
8	24.200	24.425	142.000	17.000	16.800	17.500
15	24.200	24.425	135.900	17.000	16.800	17.500
22	24.200	24.425	135.833	17.000	16.800	17.500
29	24.200	24.425	136.900	17.000	16.800	17.500
CALENDAR WEEK AVERAGES						
Nov.						
4	24.200	24.425	130.208	16.833	16.633	17.500
11	24.200	24.425	143.500	17.000	16.800	17.500
18	24.200	24.425	134.583	17.000	16.800	17.500
25	24.200	24.425	137.200	17.000	16.800	17.500

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(*a*) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(*b*) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West command a premium of 1.10c. per pound over the current market for Prime Western; Special High Grade 1.25c.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
Nov., 1950					
1	280.000	80.000	70.000d.	248s.	$35.00
2	280.000	80.000	70.000d.	248s.	35.00
3	280.000	80.000	70.000d.	248s.	35.00
4	(e)	(e)	(e)	(e)	35.00
6	280.000	80.000	70.000d.	248s.	35.00
7	Holiday	Holiday	70.000d.	248s.	Holiday
8	280.000	80.000	70.000d.	248s.	35.00
9	280.000	80.000	70.000d.	248s.	35.00
10	280.000	80.000	70.000d.	248s.	35.00
11	Holiday	Holiday	(e)	(e)	Holiday
13	280.000	80.000	70.000d.	248s.	35.00
14	280.000	80.000	70.000d.	248s.	35.00
15	280.000	80.000	70.000d.	248s.	35.00
16	280.000	80.000	70.000d.	248s.	35.00
17	280.000	80.000	70.000d.	248s.	35.00
18	(e)	(e)	(e)	(e)	35.00
20	280.000	80.000	70.000d.	248s.	35.00
21	280.000	80.000	70.000d.	248s.	35.00
22	280.000	80.000	70.000d.	248s.	35.00
23	Holiday	Holiday	70.000d.	248s.	Holiday
24	280.000	80.000	70.000d.	248s.	35.00
25	(e)	(e)	(e)	(e)	35.00
27	280.000	80.000	70.000d.	248s.	35.00
28	280.000	80.000	70.000d.	248s.	35.00
29	280.000	80.000	70.000d.	248s.	35.00
30	280.000	80.000	70.000d.	248s.	35.00
AVERAGES FOR MONTH					
Nov.	280.000	80.000	70.000d.	—	35.00
AVERAGES FOR WEEK					
Nov.					
1	280.000	80.000	—	—	—
8	280.000	80.000	—	—	—
15	280.000	80.000	—	—	—
22	280.000	80.000	—	—	—
29	280.000	80.000	—	—	—

Calendar week averages, New York Silver: Nov. 4th, 80.000; 11th, 80.000; 18th, 80.000; 25th, 80.000.

(*e*) No market (Saturday).

(*c*) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(*d*) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines...

G. P. Lutjen

» **Bringing you** the Season's greeting is the only assignment for our cover this month. As another Christmas approaches, perhaps for a moment we can relax and let what Yuletide spirit there is left in our dirty old world, take over. So—Merry Christmas!—Joyeux Noel!—Felices Navidades!—Gesundheit! (We aren't sure this last has much to do with Christmas but it's the only German we know and we don't intend to let mere vocabulary be an obstacle to our enthusiasm).

P. S. If you have a minute to spare, take another look at the cover. We are wondering how many readers will recognize the device holding the candle. Our guess is about 10%.

» **The SPCME* will find no work** in the Oliver Iron Mining Co. Nor will you find the Oliver elder statesmen at conventions sighing that "young engineers these days just aren't managerial timber." Chief reason is the top notch training program they have instituted. W. E. Cotter, Jr., Supervisor of Training, tells the story (p. 74) and it's illustrated with some really excellent photography by Fred Roleff.

It's a sad commentary on our industry that an enlightened program like the Oliver's is the exception rather than the rule. Aside from the simple humanitarian principle of giving the young mining engineer as fair a shake as he would get in other branches of engineering, many mining men, in their it-was-good-enough-for-me-when-I-started-out attitude, are wantonly wasting technical talent that could be put to good use. Or do callouses on the hands make engineers smarter? Now, if someone will help me off this soapbox...

At any rate, Marion D. VanDelinder, our trainee in the Oliver story, seems to be convinced that he has picked a good company to work for. At present he is a pit foreman in Oliver's Monroe mine near Hibbing.

» **For your Christmas stocking,** hung, we hope, by the chimney with care, we have a brief article on how to parlay your $3.00 investment in E&MJ into rich dividends. No box tops! No coupons! You don't even have to finish a sentence in 25 words or less. Just turn to page 106.

» **Somebody is making** things tough for the U. S. Mint. According to reliable sources, the Mint is worried about an acute shortage of pennies. They strongly suspect that somebody, somewhere, somehow is melting the pennies to get the copper. Such copper would cost in the neighborhood of $1.50 per pound, which would make copper awfully scarce, awfully expensive and our story awfully improbable.

» **Because we have always** enjoyed hearing about people who are adept at turning the tables, despite the odds, we enjoyed this item from *Natural Resources Notes*. A portland cement company, enjoined by court action to cease from "damaging" nearby farms with dust discharged from the plant, put in dust collectors. Now they sell the limestone dust to the farmers for land improvement.

Somehow it reminds us of the tale about the mate who got drunk aboard ship. Despite the mate's pleading, the self-righteous captain made an entry in the ship's log, "Mate was drunk today."

Facing discharge and disgrace, the mate continued pleading with the captain, but the skipper remained adamant. Adamant, that is, until the mate made a simple, truthful entry of his own in the ship's log: "The captain was sober today."

*Society for Prevention of Cruelty to Mining Engineers.

» **Remember this picture?** It ran on last December's cover. At odd moments between deadlines we have wondered how Joe Brown made out. Last month we found out.

"I want to thank you for the ad of mine that you put on the front cover of the December issue of 1949 about my wanting uranium leasers.

"I received letters, phone calls and telegrams from all over the U. S. and Canada. Thanks again."

» **Also in the mail** was a tells-you-all-about-it folder from the U. S. Civil Service Commission. They are looking for Commodity-Industry Analysts (Minerals) and are offering salaries that range from $3,450 to $6,400 a year. Well, men, here's your chance to get on Their Side. Apply to U. S. Civil Service Commission, Washington 25, D. C.

» **From Hopei Province in Red China,** there came this month what we must assume to be a communist request for a whole carload of capitalist information on New Products. If we had our way, the reply to this bird would consist of two words: "Drop dead!" Of course, it's possible that he isn't a Communist, but the surest way we know to get fleas is to lie down with the dogs.

From investigation, prompted by our curiosity, we learned that after a brief stoppage, 15 subscriptions to E&MJ are once more finding their way into China. Significantly perhaps, the name of our New Products correspondent is not on the subscription list.

ENGINEERING AND MINING JOURNAL

DECEMBER, 1950

Is Government Finance for Defense Socialistic?

WE DID SOME HARD THINKING when a letter came in (P. 73) whose writer felt that in our "Mining Program to Defend Civilization" (E&MJ, September, p. 66), we were too acquiescent to creeping socialism.

If we could be convinced that we are in any sense complacent about socialism, creeping or otherwise, we would speedily mend our ways. We most sincerely believe that, within the next 500 years at least, human society will continue to require strong selfish incentives to maintain its productivity and virility. Nothing within our experience has ever indicated that either dictatorship or the "something-for-nothing" creed has lasting strength.

The question is, "Can we consistently be devoted to free institutions and espouse Government financing in the name of national security?"

As an initial premise, we take it as self-evident that the public need for metals and minerals and national security requirements come first, regardless of what adjustments must be made within the mining industry to enable fulfillment.

This leads us to the question, "Will private finance meet these requirements without Government intervention with taxpayers' money?"

For the mining industry to meet any requirements, two things—besides personnel—are necessary: production facilities and mineral reserves.

Adequate production facilities to meet a national emergency mean capacity well beyond expectable peace-time needs. Facing a ruthless and well-armed foe, they also mean standby capacity as a precaution against sabotage and bombing.

For private enterprise to finance facilities on any such scale means to forego a reasonable probability of amortizing the necessary investments. Not only do we observe no such moves being undertaken or contemplated, but we find it difficult to visualize corporate managements being so adventurous with stockholders' money.

Turning to the subject of mineral reserves, those known (E&MJ, June 1947, P. 80) could only be rated as a basis for complacency from a national viewpoint if we were replacing a major fraction of reserves being extracted by discoveries of new mines and new districts. To replace reserves by the extension of known orebodies—as we have done in the main in recent decades—is a process that we know must taper off gradually if new deposits and districts are not found.

To achieve a satisfactory rate of domestic mineral discovery in the form of new mines will require the commitment of much larger sums of risk capital to domestic exploration and exploration research than are now flowing into such activities. Will prudent investors furnish such risk capital as long as low-cost producers are willing to ignore replacement costs from undiscovered sources in determining the prices at which they are liquidating their ore reserves? How can the answer be "Yes" when even the several producers who are making enough profit to frown on further price increases do not see fit to use these available profits in greatly expanded exploration campaigns?

Knowing many of the men responsible for mining company policies, we presume that the reasons for the situation being what it is are substantial and include the deterrents incorporated into the present tax structure. Nevertheless, can we, in such a dangerous world, expect the public, i.e. Government, to sit back until sufficient scarcity exists to spur the custodians of private funds into what, from the public viewpoint, can be considered adequate exploratory activity?

The free-enterprise fundamentalist may answer, "How can you expect free enterprise to function effectively with a political status as a whipping boy and hamstrung by unsound taxes?"

We don't. But realism compels us to observe that the public has had several chances to throw out the politicians who pillory business but has only exercised the privilege sporadically. On the tax front we and others did our utmost earlier this year to get the industry aroused over taxes but the general reaction was apathetic.

Judging by results, we conclude:

1. That, in the absence of adequate private programs of exploration and research from the national security standpoint, we must expect to see Government finance enter this field.

2. That the use of private funds for production facilities is only justified to the extent that a reasonable chance of amortization and profit exists. If the public interest requires more, it is up to Government to assume the risk.

3. That the construction of extensive standby facilities as precautions against war damage is not a proper use of private investors' funds.

Readers, Like Voters, Think for Themselves

WE ASKED A NUMBER OF OUR READERS to comment on our "Mining Program to Defend Civilization" in the September E&MJ. Their responses are well worth your time.

THAT NOBODY IS GOING to sell our readers a bill of goods without their taking a good look at the offering is evident from the comments we have received on the article in our September issue, "A Mining Program to Defend Civilization." The discerning nature of the response is gratifying, and the desire to go it on their own is heartening. Would that we could see the way to the defense program being fulfilled without Government interference in industry affairs!

Most of those commenting on our suggestions approved in the main of what we had to say, their points being principally parallel or oblique to our general theme.

Virtually all responses, however, share our misgivings over the gradual drift toward socialism to which the new taxes, Government controls, and encroachment of Government into finance with easy money provide an added impetus. Here are some examples:

Malignant Growth

"I commend you for this stimulating patriotic article. For many reasons, I'm scared—not for me but for my country and kids. While healing a sore finger in Korea, we are allowing an ulcer to grow in our guts, which will become malignant and kill us unless we act radically immediately."

"During World War II, the thinking in some important places was dismally unrealistic in the matter of prices and their relation to output. Probably that was inevitable when so much control in high places fell into the hands of some more interested in ideology than production. I certainly hope that controls, if adopted now, will be in the hands of those *still close* enough to former experience to take advantage of former errors."

"After reading your program of action for both industry and Government, I find myself substantially in agreement with your reasoning and views as to the seriousness of the situation confronting this nation. And the dangers are not alone from outside Communist aggression, but also from activities within the country directed toward destroying private enterprise and individual ownership and management of industry and property.

"Any program intended to expand our productive facilities, strengthen our industries and place our economy on a sound basis must find leadership and good example in Government. A start might be made by cleaning out rather than covering up the Communist fifth column and its sympathizers in Washington. And another helpful step would be a little less political expediency in setting up the war mobilization program and more concern for the general welfare and the ultimate consequences of inflationary influences and controls. What is done on such matters will determine whether or not we are traveling several steps farther along on the road to Socialism, toward a weakening of our industrial strength."

Take and Give

"One very excellent point is made that if the United States Government is going to control and tax the mining industry, as would seem to be necessary, then, in order that the industry be increased or maintained, the Government will have to put into it at least as much as it takes out. What this really means is that if the Government is going to be responsible for the mining industry and take the fruits of the mining industry, the Government

For Self-Restraint and Attainable Objectives

"It seems to me that the most important thing is to make it worthwhile for the ordinary citizens to take the necessary steps to make the country strong. This means that we should not either reduce production of consumer goods and living standards or take steps that will promote excessive differences in income. Billion-dollar profits of large corporations, million-dollar salaries and bonuses, and hundred-thousand-dollar non-contributory pensions are sure to increase labor unrest and undermine the faith of the majority in our social and economic system. I think they are more dangerous than Communist propaganda.

"Also, as suggested by Mr. Hoover, we must appraise our place in the world and find out what we can do without becoming a nation of unwilling policemen with all our affairs regulated by military overseers. No matter how much we deplore autocratic and tyrannical governments, we cannot cure these abuses by becoming equally autocratic and tyrannical. We must realize what we can do without losing in advance the freedom and living standard that have made our country. We cannot possibly defeat any nation in the world on air, sea and land in the locality that is most favorable for them. We can size up our resources and those our friends are willing to contribute, and based on this select the line that we should defend, not in proportion to our desires but to our ability.

"Finally, we must have faith in our institutions and strength. Our forefathers were strong because of that faith during the century in which our resources were comparatively small. They did not fear the inroads of other philosophies. If we are right the other philosophies cannot prevail, and if we are wrong we cannot prevail. More essential than any material defense or increased production is a determination to make our system work better than any other system can work. In order to do this, there must be freedom for the individual to think and act according to his beliefs."

Too Much Government for Him!

"On the assumption that government is all inclusive in its knowledge and abilities, I think you have probably done a very good job. However, if we are to restore our real system of free enterprise, which built this country and built self-reliance into this country and into its citizens, then I think we are only pointing out in these articles another way for the do-gooders and politicians who take advantage of the do-good and welfare principle to further shackle us as citizens and also our businessses. . .

"I do not think that you emphasized sufficiently the government construction projects, nor did you point out that the government could save by a transfer of many of the projects which it now has under way, such as reclamation on one hand which is taking billions of dollars, and on the other hand spending hundreds of billions of dollars with the farmers to limit their production on land now available. Many of the river and harbor projects should be suspended indefinitely during this period; certainly projects like the St. Lawrence Canal and power proposition should not be entered into at a time like this. The government, with its huge resources and huge payroll, should transfer these people into the defense effort rather than rob industry of its competent people and put forth incentives to have these people leave private industry for government work. Right now that is again a very active detriment to mining in the Northwest. Of course, as more utilization is made and more control and organization is effected by the new government politically-controlled bureaus, the further it will spread across the country to affect the basic industries. It is obvious its impact on mining, as you suggest, will be very strong.

"You remark that the government will have to put back into mining at least as much as it takes out. Britain also did this, and I need not point out to you what it has done to British mining. I quite agree that control breeds control, because control cannot work unless it is 100%, and 100% control, as you well know, is dictatorship of the most autocratic kind. You again expect to forestall inflation by allocation. How can you forestall inflation when the government itself encourages it so that the ratio of debt to the national income will not become too far unbalanced so that even the common man might get worried about it?

"I agree that production incentives are needed but a free enterprise has always taken care of its own production incentives and will do so again after government uses what it was originally established for—its police power to protect our free enterprise system, not trying to run it. . . To retain a system based on individual independence and private initiative will, as you say, call for more than mere conversation by its advocates. It means that each of us must resist to the utmost the government encroachment and refuse to become a party to it. If not, the creeping Socialism, which is now standing erect and beginning to walk, will run us down. This, of course, has to do with taxation, because if we admit government control at all we are going to have to keep on paying until we have nothing left to pay with and enjoy a common poverty, that has historically been the end of government control. . .

"I would like to ask how you are going to build up an economy under government control and allocation. In our free enterprise system if the price got too high and too far out of line, whether it applied to mining or whether it applied to peanuts, other people immediately went into that business and some balance was restored without a burden on the taxpayers or control by the government. . .

"I do not agree that the government should finance anything other than that which is strictly necessary to the use of its police power, to see that citizens are fair with one another and to promote the general war effort. I, as a taxpayer who does not eat peanuts, should not be forced to finance the peanut planters, and that is all government financing amounts to. . .

"Give the mining industry an adequate price for its products and the development and the material which they are called upon to find will be forthcoming, and let those who are crying for government help sell their interest to those who still believe and are willing to practice our real American system of free enterprise. Too many of us are talking but not practicing that system."

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officials will learn what most of the people in the industry have long known; that is, that more money has been put into the ground looking for minerals than has ever been taken out in the forms of profits. If the ENGINEERING AND MINING JOURNAL could make that plain to the people responsible for Government policy, they would do the mining industry and the country a great service."

"I would urge as a general premise that there is no excuse for Government intervention in business unless the products of that business are necessary for national use in times of critical emergencies, such as war. In general, if business cannot stand on its own feet without Government subsidies, it deserves to fail. On the other hand, where the production of certain metals (not necessarily all metals) is essential for the national safety in times of national crises, it is a proper function of Government to see that those metals will be made available in the event foreign sources are cut off. Due to marine transport hazards, it would be desirable if this production could be assured from the North American continent."

Critical Views

Even this early in the defense program some of our readers don't like what they have already observed as to the way things are going:

"We do not feel that Washington has been too constructive in their approach to the problem of obtaining supplies of metals for defense purposes. Unless these problems are handled realistically, and of course the mining situation is included in my observation, ordinary civilian activities will be very seriously interfered with. After election we may possibly settle down to a better understanding and a more cooperative approach to many problems that beset the non-ferrous metal industry."

"There is a substantial production potential in the Tri-State that can be had at a price, and, in view of the serious shortages of zinc and under existing costs and open market conditions, that price to recover them does not seem to me to be an exorbitant figure. Government, under the authority given by the Defense Production Act, can put into effect whatever plans it wants to recover this production potential, but has not and apparently does not intend to move in that direction.

(Continued on p. 159)

To Help Us Show How Oliver's Training Program Works, We Chose:

1 TRAINEE, "Van" VanDelinder. He's wearing the safety glasses that every Oliver employee wears out on the job. Begin on the opposite page, and let W. E. Cotter, Jr., tell you what Van did during his 18 months' on-the-job training.

NAME:
Marion D. Van Delinder.

BIRTHPLACE:
Poplar, Montana, 1921.

EDUCATION:
Grade school in Lone Ridge, Mont.
High school in Belgrade, Mont.
College at Montana School of Mines, Butte, Mont. Graduated in June, 1948, in top fifth of class.

MILITARY SERVICE:
Enlisted in Army Air Force; saw three and one-half years' active service, two years of which were spent in Asiatic-Pacific theater.

PREVIOUS EXPERIENCE:
Surveying with U. S. Department of Agriculture in Wyoming.
Construction and exploration work in Wyoming.
Year and a half as miner while going to school in Butte.

PRESENT POSITION:
Joined Oliver Iron Mining Co. on graduation, June, 1948.
Spent 18 months in training course; now pit foreman in Oliver's Monroe Mine near Hibbing.

Oliver's Training Program

It helps young engineers get started and builds a strong future management. Oliver Iron Mining Co. trained this man, as it trains all its new engineers, as a worthwhile investment in its own future.

W. E. COTTER, JR.[1] and FRED ROLEFF[2]
Duluth, Minn.

FACED WITH THE COMPLEXITIES of a changing iron mining business, the Oliver Iron Mining Co., a United States Steel subsidiary, is directing its efforts in operations, engineering, construction, and research toward building a stable and productive future on the Mesabi Range in Minnesota.

To insure provision of a management capable of directing that future, Oliver has widened its college recruiting activity and established a thorough engineer training program. The objective is to achieve for the future the strongest possible supervisory and technical staff.

Oliver does not wait for good men to come to the company, but goes after them, showing them that Oliver offers the opportunities that college graduates are seeking. Then, having secured good men, the company knows it must live up to its promises if it hopes to keep them. Selection of good men is wasted if they are not properly oriented and trained when they start their careers.

In showing how this on-the-job training program for graduate engineers works, Oliver makes no claim for success at this early date. The program is only in its third year, and since its objectives lie in the distant future, any present evaluation is limited in scope. Yet the company is well pleased with the immediate results and feels that if it follows its outlined course, a strong and able technical and supervisory staff for the future will be safeguarded.

Since the program started in 1948, Oliver has hired 74 men as trainees. Of these, 35 have been assigned to permanent positions, 29 are still in training, and 12 have left the company. Of the 12 who left, some entered business for themselves, others sought greener pastures. Some were let go because their work was below standard. The Army took one. These figures now serve only as caution signs in future selection of trainees. In the long pull, of course, such statistics will have more weight in a judgment of the program.

Men who have completed our training program have gone into a variety of positions, including: mining engineers in open pit and underground work, pit foremen, maintenance engineers, assistants to supervisors, and exploration outside the United States. In nearly all instances, the new job has been highly satisfactory to the man and to the company.

Here are a few of the things Oliver feels it important to watch:

1. Determine accurately the organizational needs of the future.

2. Place administrative responsibility for recruiting and training in one department.

3. Retain on-the-job features of training, as opposed to training by mere observation.

4. Hand the trainees as much responsibility as possible.

5. Keep close personal contact with trainees all through the course.

With these principles, and others, in mind, Oliver feels that it is on the way to insuring a management force adequate to deal with the increasingly complex problems of the future.

[1]Supervisor of Training, Oliver Iron Mining Co., Duluth, Minn.
[2]Photos by Fred Roleff, Zweifel-Roleff Studio, Duluth, Minn.

2 INTERVIEW "We met Van," (Bill Cotter speaking), "at the Montana School of Mines on our regular visit to several colleges to talk to seniors. That's Lloyd Severson, Oliver's assistant general engineer, behind the desk. We liked Van's looks and record; he liked what he heard about Oliver.

3 FIRST DAY "Van came right to my office in Duluth after graduation. As training supervisor, I was to see that he got started right."

Van Reports For Work

"DURING MY FIRST VISIT WITH VAN, I outlined the purposes of the training program and tried to answer every possible question he might have concerning it. We took up salary, living conditions, company regulations, insurance plans, merit rating, everything.

"Then I took him around to meet a few men in the General Office Mining Engineering Department. I didn't take him in to meet top company officials. We don't want our trainees to feel like fair-haired boys. We'd rather they realized that their progress while in training is dependent on their own abilities.

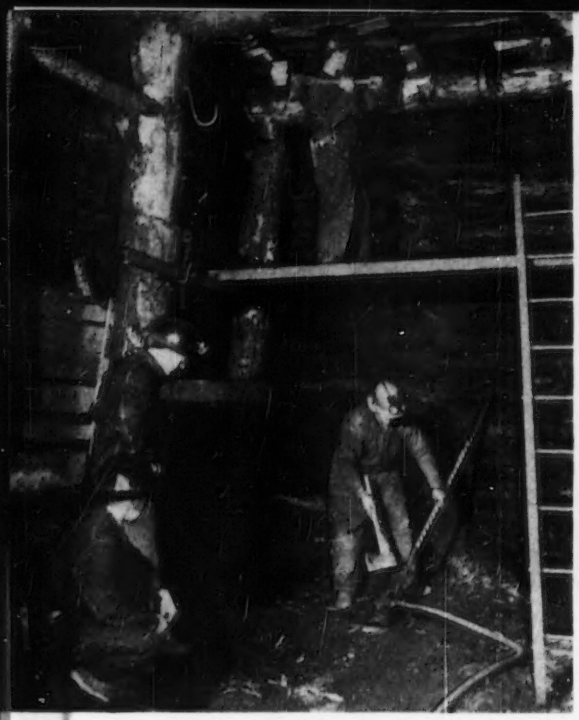
"I took plenty of time to talk over Van's training schedule with him before he left Duluth for the Range. This schedule had been arranged long before Van got to Duluth, but there was still time to make any changes in it that seemed desirable after our talk. Then, after a physical examination, Van was ready to go to the district to which we had assigned him.

"The Canisteo district office, where Van began his training, had been told that he was on the way. He stopped in first at the Industrial Relations Office in Coleraine so that his arrival would be recorded there. Then he was taken in to meet Leon Battles, chief mining engineer for the district, who was his major supervisory contact in the district. He also met the other men in the mining department, and also E. A. Friedman, general superintendent for the district. Mr. Friedman took the time to take Van on a quick trip around nearby properties.

"Everyone Van met in the office was eager to help get him started right in finding his place in the company's operations. They encouraged him, too, to take an active part in after-hours company and community activities, so that the getting-acquainted period would be shortened."

(*Continued on next page*)

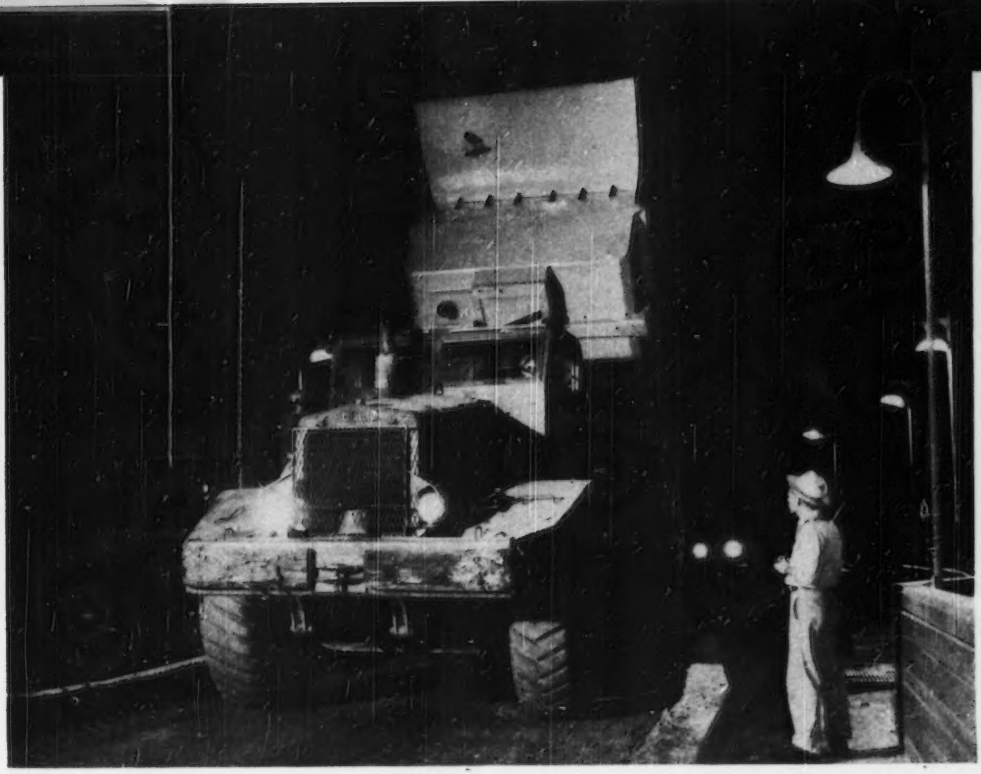
4 INTRODUCTION "after the preliminaries (see text at left), Van reported to the Canisteo District, where he began 18 months of training. Here E. A. Friedman, general superintendent, shows Van the Gross-Marble pit."



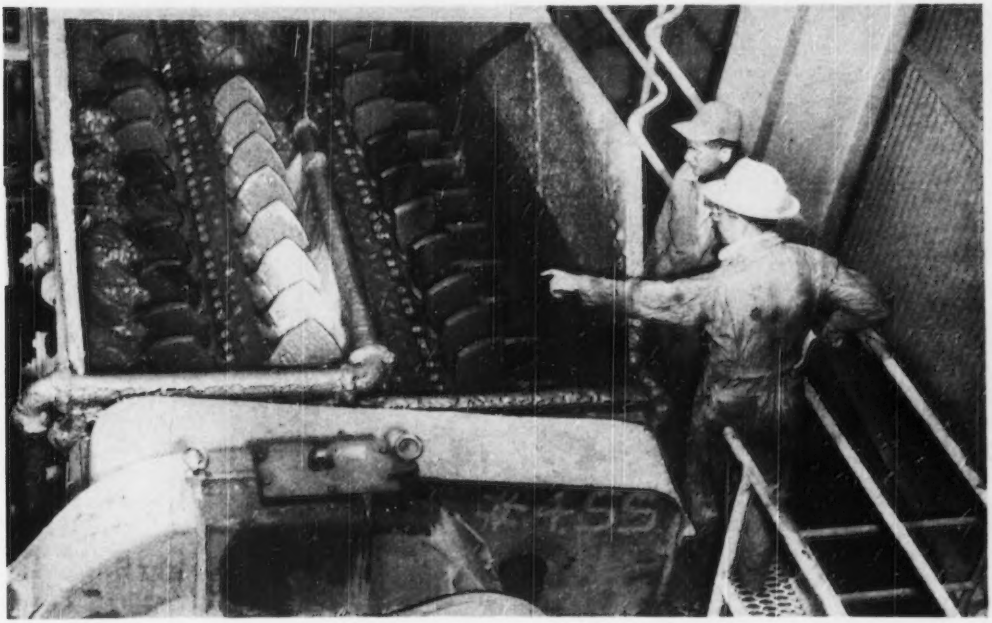
5 SAFETY—TWO WEEKS "Van, like all our trainees, spent two weeks with the Safety Department. He learned the importance of safe methods and got a look at all Oliver's operations. Here he's making the rounds in the Godfrey mine with Bill Tellor, safety inspector."

6 ENGINEERING—FIVE MONTHS "The first work assignment for Van was with the Canisteo engineering staff. He's shown above shooting the Walker pit. Later on, Van spent more time in the office on pit planning, ore estimating, trespass work and individual mine problems."

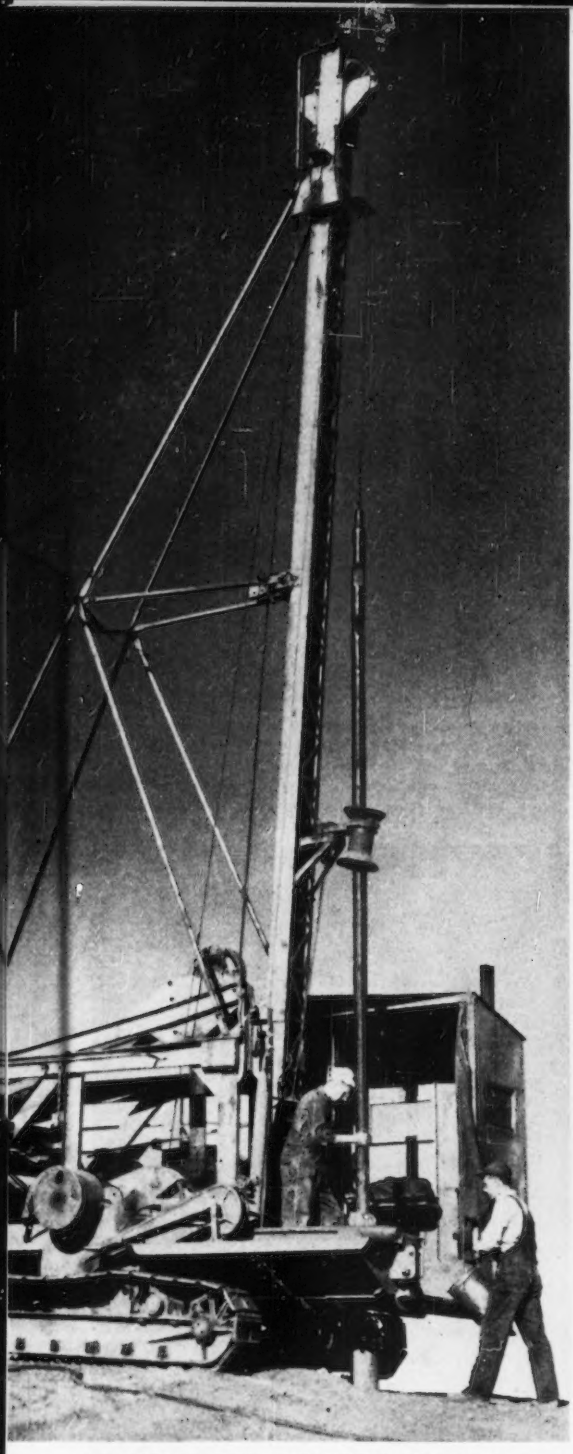
7 ACCOUNTING—THREE WEEKS "As a clerk in Oliver's accounting department, Van learned the importance of clear and accurate records. Here John Griffith, cost analyst, is helping Van prepare payroll information. In this way, Van soon learns where labor and material costs originate, and how production workers are scheduled."



8 OPERATION—FOUR MONTHS "Training in the Operating Department brought Van into contact with all phases of the production end of Oliver's mining job. He worked as a pit boss and learner foreman for several months. He was exposed to the problems of open-pit operation on all three shifts, and he learned quickly that the operator's job doesn't end with the change of shift. Here he also saw evidence of the all-important job of getting along with others. In this photograph, Van is shown checking trucks at an open-pit dumping point."

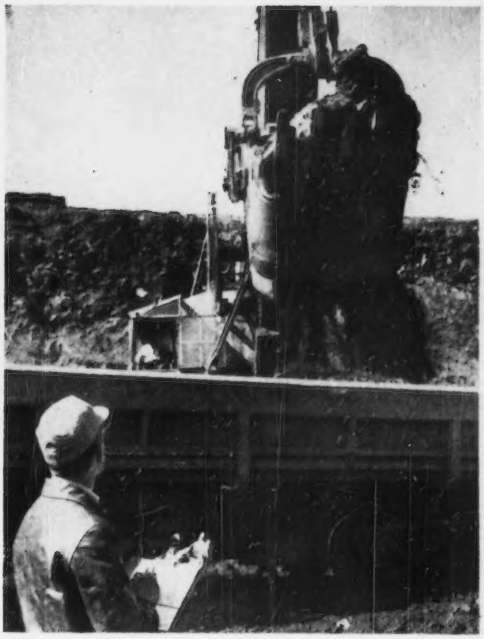


9 WASHING PLANT—SIX WEEKS "Here's where Van got a chance to check his memory of the things he learned in the ore dressing course back in Butte. This photo shows him, as a supervisory trainee in one of Oliver's washing plants, explaining to Joe Derfler some log washer difficulty. This is theory put into practice."

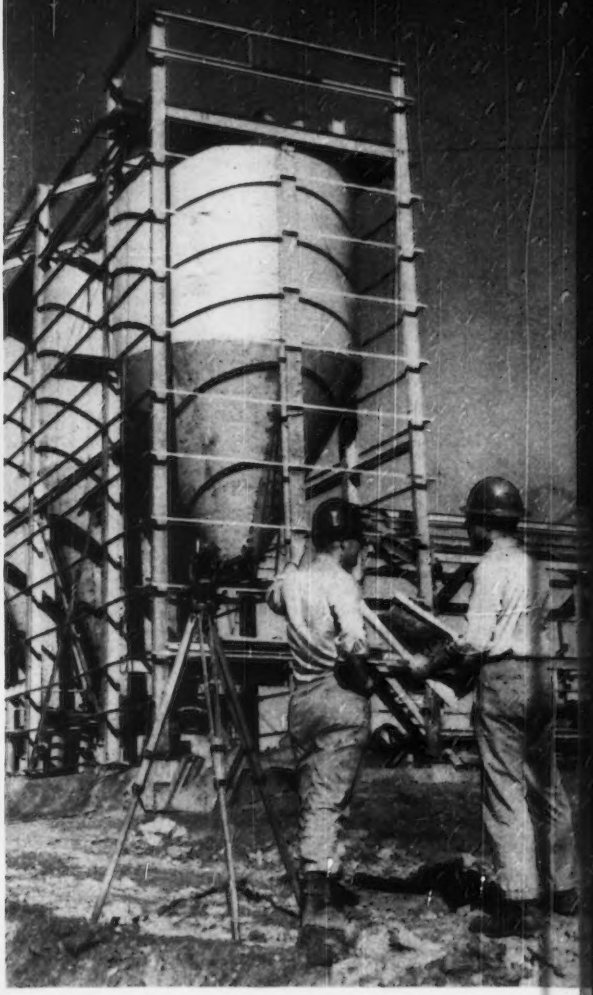


10 EXPLORATION—SIX WEEKS "Van put in some time with the drill crews, as a helper on both churn (above) and core drills. He also worked with geophysical parties on special jobs, helped to prepare their reports."

11 ANALYSIS—THREE WEEKS "The why and wherefore of analysis and ore grading were cleared up for Van by taking samples, preparing and assaying them. This taught him the meaning of quality control."



12 BUDGETS—ONE MONTH "Van learned how budgets are set up and cost and time studies made in his work with the budget engineers. He's shown making a time study on Oscar Pickera's shovel in the Hull Rust pit."



13 CONSTRUCTION—TWO MONTHS "Van learned construction on the new sintering plant job at Virginia, Minn., near the Rouchleau mine. Dean Peterson, shown with Van, once took Oliver's training course, too."

14 MAINTENANCE—ONE MONTH "So that Van would know what good maintenance means, we routed him through that department. Here he helps change a dipper tooth, and (right) tries his hand with the stinger on a General Shop repair job, where he worked as a helper on automotive and railroad car repair."

15 REGULAR MEETINGS "Right along with the on-the-job training, we hold monthly meetings, where all the trainees and a few company supervisors get together to discuss problems of general company interest. At this one, Oscar Anderson and Norman Moberg, planning engineers, are discussing the vital topic of mine planning. Next to Van (second row) is J. E. Machamer, Oliver operating vice president, who sat in this time."

We Check On Van's Progress

VAN'S WORK PERFORMANCE is rated monthly by his immediate supervisor so that he will learn "how he is doing" and so the company can keep up with his progress. Van sees his ratings and discusses them with the training supervisor and his immediate boss. Ratings do not tell the whole story about Van, and because of the subjective approach of most men to merit rating, they cannot always be relied upon. But the ratings can be used as another tool in determining Van's capabilities and potentialities. And if a man is not up to par or is misplaced, he learns about it at the outset and not years later when it is too late for adjustment.

Once a month Van writes a report on his training. It is not a technical report. It is in narrative form and covers his work assignments, personal comments and suggestions. Trainees are asked to be frank and outspoken in the reports and changes have been made in the training program as a result of trainee suggestions. Many trainees, while capable in other respects, have proven to be unsatisfactory in report writing. The report is another standard by which the men can be measured. (For a sample see typical report at right.)

The working schedules of the trainees are supplemented by a small amount of reading material, which is distributed by the Industrial Relations Department. A lecture program, with a variety of informative topics and employing speakers in various fields important to the company, is conducted for all trainees. Some of the topics covered are as follows: history of the company, organization of the company, federal and state tax problems, geology of the Lake Superior District, planning for operations, costs and budgets, safety, develop-

Here's A Typical Report From Another Recent Trainee.

MONTHLY TRAINING REPORT FOR SEPTEMBER, 1950

NAME:

HIBBING-CHISHOLM DISTRICT

The period from September 1 to 15 was spent in the Maintenance Department, specifically in Shovel Repair. This experience was valuable, partly for the "nodding acquaintance" with shovel mechanics and problems of shovel repair gained, but equally important for the practice in getting along with men.

It is interesting to note that the proper method of getting along with a group of men as a fellow worker and of getting the best work from them as a supervisor is to a considerable degree a function of the type of work the group does. There are, of course, certain general rules which may always be applied, but superior results can be obtained only by applying a greater degree of psychology. Probably perfection could only be achieved by a complete understanding of all the individuals in the group. This, however, is impossible for obvious reasons. Therefore, it is desirable and necessary in the interests of efficient operation to hit upon the particular "key" to the group with which one is concerned. For example, with the Bull Gang a willingness to be of assistance within the limits of my capabilities and a disregard for the grease and grime involved by such action were, I believe, the open sesame to genuine

16 **THE JOB "Here's Van, on the job at last, as pit foreman in the Monroe mine near Hibbing, following his training. His course taught him that his real training has only begun, and that he won't learn overnight all that a top-notch foreman must know. But he knows, too, that he's on the way."**

ment of the company's labor relations, research and engineering development, and numerous other topics of interest and concern to Oliver. Trainee meetings are held from time to time to discuss training matters and information of interest to the training group.

Trips to the operations of other mining companies and other industries in the area are arranged at various times. And groups of trainees are given the opportunity of participating in continuation studies conducted in the area, such as mining symposiums, accounting meetings and industrial relations conferences.

What Comes After Training?

THE QUESTION of what comes after training is a natural concern of Van's. It is explained to him that before he was hired an organized study was made in the different departments of the company to determine the required number of engineers and the specific openings which occur 18 months after the trainee reported for work. In other words, there is definite assurance of a specific job for Van when he winds up his training. In answer to the question, "What happens to me after my training period?" the Oliver says the following in its training handbook:

"It is not possible to tell you at the outset of your training where you will be and in what capacity you will be working when you finish training. By that time you will have had the opportunity to look over the company and the company will have had a reasonable chance to get acquainted with you. If the training program has been successful up to this point, you should have a good perspective of the many activities of the company, have developed some definite ideas as to the type of work for which you feel best suited, and thus be able to start your active career with a sound understanding of company objectives and your part in them. You should understand that upon completion of your formal training program your real training is just beginning.

"As explained to you before you were hired, opportunities for trainees exist in all departments of the company. To fill predetermined position openings, the company reviews available men on the basis of merit, interest and suitability for the job. The fact that a man is or has been a trainee is not of itself a reason for his being considered before others. When considering promotions it is a company policy to review all eligible men and to select the best man for the position."

" 'What comes after training?' is a question about your future and the future of your company. The answer to it lies primarily with yourself and your understanding that a company such as Oliver has many advantages and opportunities to offer its employees in return for active and aggressive participation in the activities to which they are assigned."

---

liking and respect. On the other hand, with another group with which I have been associated, such a course would have resulted in complete "loss of face" and subsequently of authority.

Anyone in a supervisory capacity has a ticklish road to tread. He must simultaneously be accepted by his subordinates yet remain aloof from them. For best results, the bit of authority must be firm to guide but never chafe.

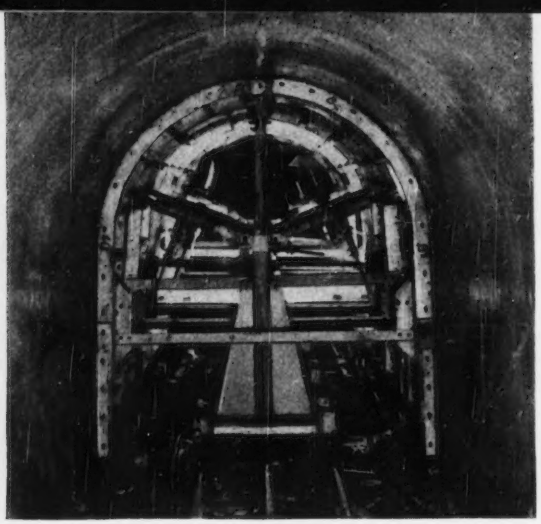
On September 16 I reported to the Engineering Department. For the first week I assisted with the 5-Year Plan of Operations and worked on cross-sections. Some of the work was a little deep for me but none the less interesting.

September 24, I went out to the Monroe where I have been working with a surveying crew, chiefly shooting stadia. The biggest lesson I have learned is the importance of the rodman. It is far from a matter of just holding up the rod. The rodman in stadia shooting must quickly recognize features of terrain and their connection with other features—no mean task. He must place his shots in such a way as to facilitate plotting. In fact, his job in stadia surveys is far more important than that of the instrument man, and every engineer should be well acquainted with the job so he may, if necessary, train his crew to give him proper service so that accurate results may be obtained.

SIGNATURE OF TRAINEE

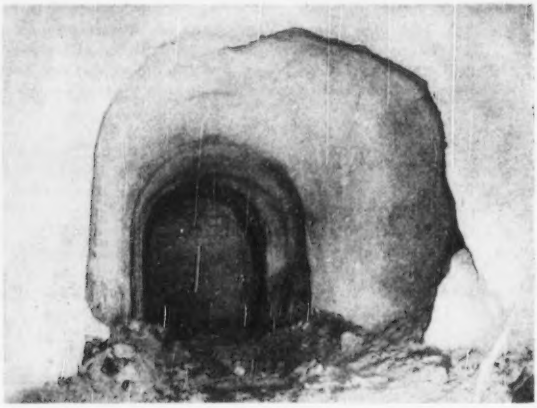
HIBBING, MINNESOTA
OCTOBER 4, 1950

CONCRETING of slushing drifts has made unnecessary repairs once needed in all timbered transfers.

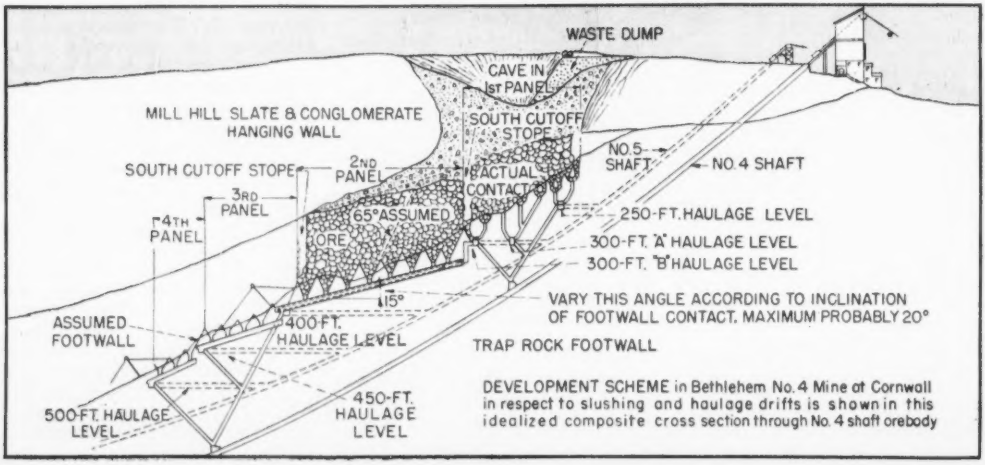


FORMS ARE IN PLACE in this slushing drift. Finished lining is seen in front. View taken looking up 30% grade.

HAULAGE DRIFT in which lining has been completed and where intersection has also been concreted.



NOW MINED OUT, the stope above this concreted slushing drift has yielded 65,000 tons which drift has handled.


WASTE DUMP
CAVE IN 1ST PANEL
MILL HILL SLATE & CONGLOMERATE HANGING WALL
SOUTH CUTOFF STOPE
SOUTH CUTOFF STOPE
2ND PANEL
3RD PANEL
4TH PANEL
ACTUAL CONTACT
65° ASSUMED
ORE
NO.5 SHAFT
NO.4 SHAFT
250-FT. HAULAGE LEVEL
300-FT. "A" HAULAGE LEVEL
300-FT. "B" HAULAGE LEVEL
15°
VARY THIS ANGLE ACCORDING TO INCLINATION OF FOOTWALL CONTACT. MAXIMUM PROBABLY 20°
ASSUMED FOOTWALL
400-FT. HAULAGE LEVEL
TRAP ROCK FOOTWALL
500-FT. HAULAGE LEVEL
450-FT. HAULAGE LEVEL
DEVELOPMENT SCHEME in Bethlehem No. 4 Mine at Cornwall in respect to slushing and haulage drifts is shown in this idealized composite cross section through No. 4 shaft orebody

Concreting Has These Advantages

1. The most obvious safety feature of the concreted drift is its greater capacity to protect men from falling debris.

2. Elimination of hazardous repair work.

3. Elimination of heavy lifting.

4. Less experienced timbermen are required for both original placement and occasional repairs to finger openings.

5. Development of haulage and slushing drifts can be carried out far in advance of work actually required, with no deterioration of the development workings. This can be especially advantageous during shutdowns.

6. The driving of both slushing and haulage drifts with an arched section has permitted the drifts to stand unsupported until they can be lined with concrete.

7. The fire hazard from timber is eliminated. Recently the slushing-drift hoist stations have been concreted, eliminating the danger of fire through electrical hazards.

8. Cleaning of spillage in haulage drifts with air shovels is made easier in the concreted drifts due to smooth sides and a higher clearance.

9. Concrete being a poor conductor of electricity, electric blasting has been made safer.

10. The trolley wire is always on the south side of the haulage drift. The walkway along the haulage drift and the manway ladders to the slushing drifts are kept on the north side. With timber sets the walkway side clearance was only 9 in. at the posts. Although we had 19 in. of clearance between the posts, we have had a few accidents involving the squeezing of a man. In the concreted drifts, the walkway clearance is 18 in. Safety stations every 40 ft. make an additional 2 ft. of room.

11. In the timbered slushing drift, miners would occasionally hang blasting fuse and place dynamite behind the timber, to be used later. Often this would be forgotten. In one instance, firing of a finger blast set off dynamite in the blocking with considerable damage. This has been entirely eliminated in the concrete-lined drifts, fuse and dynamite being kept in proper storage boxes.

Concreting Pays for Slushing and Haulage Drifts

JOSEPH BERNHARDT
Superintendent, No. 4 Mine
Bethlehem Cornwall Corporation
Cornwall, Pa.

MANY ADVANTAGES in respect to safety and operation underground have been realized by Bethlehem Cornwall Corporation at its iron mines in Pennsylvania through its adoption of the practice of lining slushing and haulage drifts with concrete. These advantages are tabulated above. The company is a subsidiary of Bethlehem Steel Company.

The property operated by this subsidiary is at Cornwall, in Lebanon County. The iron ore it contains consists of two separate lens-shaped deposits approximately a mile apart. One of the orebodies originally came to surface in an outcrop on which open-pit mining was begun in 1742 and continued without interruption. This mine is also served by a shaft for working the part of the ore that is not recoverable by open-pit methods.

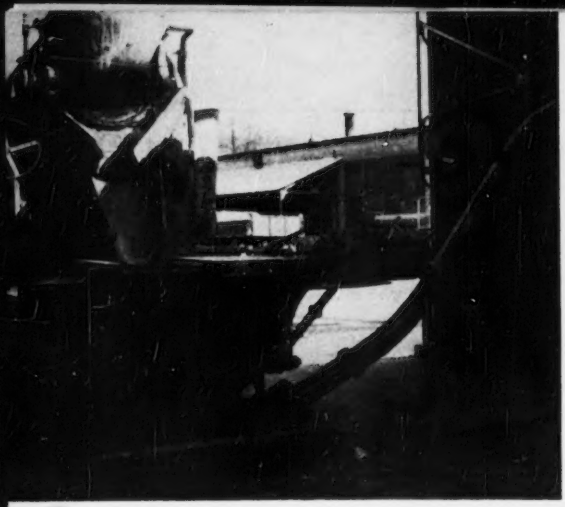
The other property has no outcrop and is worked entirely by underground methods. Known as the No. 4 Mine, it is serviced by two inclined shafts 220 ft. apart. For hoisting rock and ore No. 4 shaft is used, and for handling men and materials No. 5 shaft. Each shaft is sunk on a catenary curve, closely following the dip of the ore. The slope at the collar is 36°, flattening to 26° at the bottom. The footwall is a traprock which varies structurally from solid to highly fractured. Headings mined in footwall must soon be supported.

Early mining development consisted of haulage drifts at 50-ft. intervals vertically, with transfer raises to breaking subs. Grizzly stations at the top of each chute raise were reinforced by setting timber sills on concrete. Occasionally it was necessary to concrete the entire chute raise. Concreting was done by using ½-cu.yd. electric mixers set up in the breaking subs. Sand, crushed stone, and cement were hoisted through the chute raises mentioned to the subs.

Late in 1937 it was decided to eliminate chute raises and breaking subs in future development. When the orebody has less than a 40° dip, slushing drifts are driven normal to the haulage drifts and on 40-ft. centers. In a few areas, the orebody dips more steeply than 40° and slushing drifts are then placed parallel to the haulage drifts. Finger raises are opposite each other and on 20-ft. centers, making 20x20-ft. draw areas. See drawing. Two-drum, 50-hp. scraper hoists and 54-in. scrapers are used in loading 90-cu.ft. cars. The lengths of slushing drifts vary from 90 to 200 ft., depending on the dip of the orebody.

The slushing drifts were timbered with 10x10-in. posts and 10x12-in. caps. Sets were spaced to make three spaces 4 ft. 8 in. and one space 6 ft. center-to-center of timber. Two additional framed sets were then placed inside the 6-ft. space to form the finger opening. The sides of the fingers were concreted to 12 in. above the drift timber and a heavy round timber was

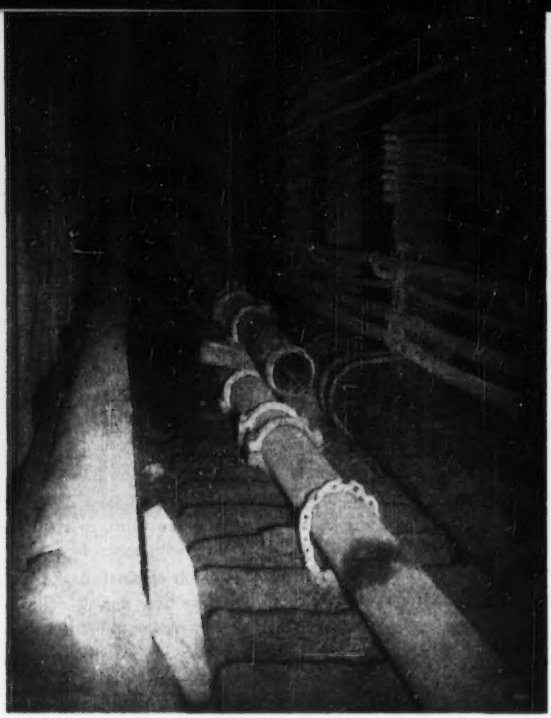
A paper presented at the National Safety Congress, Chicago, Oct. 17, 1950.



ON SURFACE, the "ready-mix" concrete truck dumps its load into surface placer for delivery underground.

Table 1. Concreting Equipment Purchased

One ¾-cu. yd. pneumatic concrete placer	$3,250.00
One lifting frame	400.00
Seven ¾-cu. yd. concrete hoppers	770.00
Seven 5-ft. sections, collapsible steel concreting forms, including 4 travelers	4,025.00
One 20-ft. 6-in. rubber concrete hose	400.00
Two 90° shooting boxes	300.00
	$9,145.00



CONCRETE PIPE LINE goes down main shaft manway. Level line, in the center, is shown here disconnected.

placed on top of the concrete to act as a bumper cap.

Until 1943 all concrete was mixed at the mine. Since then, ready-mixed concrete has been used exclusively. It is delivered from Lebanon, about 6 miles away. Other uses of concrete are for the shaft back, level landings, and ore-pocket raises.

The Slushing Drift

In all cases, timbered slushing drifts required repairing before being drawn empty. The timbering in many of the drifts had to be completely replaced and sometimes second repairs were necessary. Such a drift is shown in a photograph on page 82.

In 1945 decision was made to experiment with concreting slushing drifts. It was expected that the initial cost of concreting would be higher than the cost of timbering a drift. However, if timber repairs were eliminated, considerable savings would result. Use of concrete would also eliminate the hazardous work of timber repair.

The equipment listed in Table I was ordered and received in November, 1945.

The linings of the first drifts were poured solid without finger openings. Cutting of the finger openings through the concrete proved costly, however, and it was decided to form out the openings.

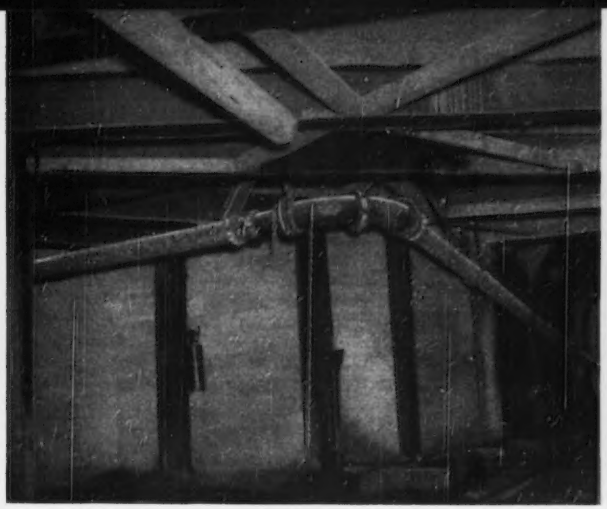
The slushing drifts are driven 7 ft. 6 in. wide and 8 ft. 9 in. high. If the rock holds up well, the finger openings are cut in the ribs of the drift before placing the forms. Three 40-lb. rails on wood ties are laid in the drift floor. The two outside rails are then put in position on 30-in. gage to hold the carrying travelers of the steel forms. The three rails later make the scraper bottom of the drift.

Four 5-ft. sections of form placed on two travelers are used for each concrete pour. With fingers on 20-ft. centers, the joint is placed between the fingers. To form the finger openings, prefabricated wood is used on the side arc of the steel forms. The sides of the openings are tapered, the opening into the drift being 42 in. wide and 54 in. high. A rail is placed across the top of the opening to give added strength. No other reinforcing is used.

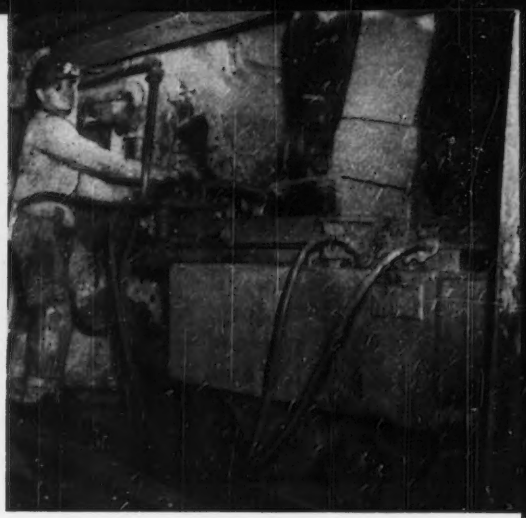
The concreting cycle consists of pouring 20 ft. one day, stripping and moving the forms up the drift the next day, and pouring again the third day. Concreting is usually carried on in two adjacent drifts or in two drifts on separate levels. This allows a 20-ft. pour every day. The minimum thickness of concrete is 12 in. on the top and 9 in. on the sides. The finished size of a concreted drift is 6 ft. wide by 7 ft. 6 in. above the top of the rail. See the photograph taken looking up a 30% grade on page 82.

Two Placers Used

At first when the drifts were concreted, the placer was set up underground as close as possible to the job to be poured. Concrete was taken down the shaft in ¾-cu.yd. hoppers. This procedure kept our material skips too busy and it was decided to set the placer on the surface. A second placer was purchased and set up on the level in which slushing drifts were being poured. A 6-in. pipe line was placed in the manway of No. 5 shaft. This line at present runs to the 820-ft. level and has take-off pipes at the 650, 700, 760 and 820-ft. levels. (The level designation is the vertical distance below the shaft collar.) The placer underground handles the slushing drifts on two haulage levels, blowing uphill to one



SIX-INCH LEVEL LINE comes from the shaft through the crosscut and turns into the haulage way.



TRANSFER PLACER used on blows that have to be made over 2500 ft. from placer on surface.

Table II. Cost of Lining Slushing Drifts With Concrete Compared With Cost of Timbering

	Concrete	Timber		Concrete	Timber
Lineal feet	3,611.5		Cu. yd. per foot	1.44	
Total man shifts	3,686.5		Labor cost per lineal foot	$12.08	$20.07
Cu. yd. placed	5,208.75		Material cost per lineal foot	$15.26	$12.44
Man shifts per foot	1.02	1.78	Total cost per lineal foot	$27.34	$32.51
			Total cost per cu. yd. placed	$18.99	

and downhill through manways to the slushing drifts on the level below.

Later, it was decided to try using only one placer on the surface, blowing direct to the forms. In a slushing drift which was concreted recently, the concrete traveled 1,350 ft. down the shaft, 1,316 ft. along the haulage level and through a vertical distance of 30 ft. to get into the upper end of the form, a total of nearly 2,700 ft. At this distance the concrete was somewhat dry and showed some segregation, using a 1-2½-3½ mix. Time required to blow the ¾ cu.yd. was about 8 min. With the two placers in use, the operation required only 2 min. for each placer, a total of 4 min. The use of two placers also resulted in better concrete. Two placers are now used wherever the distance blown exceeds 2,000 ft. This saving in blowing time has often made it possible to complete two jobs in 7 to 10 hr. The record pour for 8 hr. is 92 cu.yd.

Although the concreting equipment was received late in 1945, very little concreting was done until 1948. Three slushing drifts were concreted during 1946. We decided to wait until these drifts were drawn empty before changing over

Table III—Costs of Concreting Haulage Drifts and Timbered Drifts Compared

	Concrete	Timber
Lineal feet	*1,034	
Total man-shifts	613.5	
Cu. yd.	1,617	
Man-shifts per foot	0.59	0.60
Cu. yd per foot	1.56	
Labor cost per foot	$ 6.99	$ 7.10
Material cost per foot	$16.77	$10.55
Total cost per foot	$23.76	$17.65
Total cost per cubic yard placed	$15.23	

*This 1,034 ft. of concrete was placed in 1,650 ft. of haulage drift. Safety stations are provided every 40 ft. Timber included criss-cross blocking of sides and safety stations every 80 ft.

Footages of Timbered and Concreted Drifts, By Years

	1947	1948	1949	1950 (6 months)
Timbered slushing drift	2,075	742	652	0
Timbered haulage drift	625	125	0	0
Concreted slushing drift	75	2,149	1,203	1,809
Concreted haulage drift	0	315	984	479
Total	2,775	3,331	2,879	2,288

to concreting on a large scale. One of these slushing drifts, emptied November, 1947, handled 31,000 net tons; the other was drawn empty in February, 1948, and handled 47,000 net tons. Both of these drifts held up well, requiring no repair. Timbered drifts on both sides of the concreted drifts required extensive repair.

The cost of 38 concrete-lined slushing drifts completed between May 1, 1948, and May 1, 1950, is given in Table II. Concrete now costs $10.75 per cu. yd. The average cost of concrete used to date is $10.60 per cu. yd. Labor rate averaged $11.84 per man-shift.

The average cost of a timbered drift, including the cost of pouring finger openings by hand, was $31.51 per foot, as compared with $27.34 per lineal foot of concrete-lined drift. Concreting the slushing drift has actually made possible this saving of $5.17 per foot, excluding future repair costs required with timbered drifts.

To date 15 slushing drifts have been drawn empty. These drifts contained 130 fingers or draw points. It has been necessary to repair only six draw points. This was done by first blocking off the raise with poles and plank. Steel forms were placed, finger openings formed and the concrete poured.

Concreting the Haulage Ways

Decision was made to concrete the haulage ways even though first costs were estimated to be higher than for the timbering. Elimination of repairs would result in an over-all saving. Repairing timbering where tramming is done on three shifts is very inefficient.

Concreting of the haulage way consists in lining 25 ft. of drift and leaving 15 ft. unlined for the slushing-drift loading station. This is repeated throughout the drift length. These unlined 15-ft. sections are temporarily supported with one timber set blocked to the concrete. This timber is removed when loading stations are required.

For concreting haulage drifts very little hand-forming is required. The ends of the sections are closed off and in the center of each 25-ft. section poured a safety station for men, 3 ft. wide, 2 ft. deep, and 6 ft. high, is formed. The stud bolts for trolley hangers are placed in the form before concreting. The steel forms are offset 2 in. on the travelers. This makes 4 in. greater clearance on the side opposite the trolley wire. The size of the concreted drift is 8 ft. 1½ in. wide by 7 ft. 6¾ in. high above the top of the rail. An accompanying picture shows part of a completed haulage drift, in addition to a concreted intersection.

Cost of concreting haulage drifts during 1949 and early 1950 are given in Table III.

Slushing drift footage required is about three times that of haulage drifts.

Timbered slushing drifts were drawn empty, leaving haulage drifts with concreted slushing drifts exclusively on the following dates: 550 level, May, 1949; 600 level, April, 1949; 650 level, January, 1950; and 700 level, June, 1950.

From this it is seen that the real benefits of having practically no repairs were not attained until 1950, when footage increase was made with fewer men.

The average number of timbermen used daily in 1947 was 46.2; in 1948, 49.8; in 1949, 47.2; and in 1950, 38.0.

The advantages and safety features that have become apparent as this work in concreting haulage and slushing drifts has progressed are tabulated on page 83 of this article.

Some necessary precautions are required. We may list:

1. Use of respirators and goggles is required by men concreting. (However, only limestone, sand, and stone aggregate are used, eliminating the silicosis hazard.)

2. Some hazard results from forming-board nails, causing puncture wounds. This is practically eliminated if working places are cleaned daily.

3. Good communication is essential between the points where the blowers and forms respectively are located. This is done by using independent voice-powered phones.

4. Firm hand-holds were installed in the roof of concrete slushing drifts between finger openings. Some hazard from rolling chunks in drifts having 35% grade is evident. In a timbered drift men could step out of the way by holding on to the timber. In concreted drifts handholds are essential.

Conclusion

In conclusion, it is well not to compare construction work and the work of lining drifts with concrete in a producing mine. In construction work, the placer or pump is usually set close to the forms. The placer can then be emptied in about 45 sec.; 200 to 300 cu.yd. per shift is not unusual. With our long pipe lines, however, 100 cu.yd. would be the maximum amount poured. Three to four sets of forms are used. This allows daily pours to one or two sections, while moving and forming the other sets.

Average weekly pours are 125 to 200 lineal feet of tunnel, requiring 1½ cu.yd. per foot. A monthly high of 1,125 cu.yd. was used for lining drifts and miscellaneous construction work.

Haulage Costs Held Down by Maintenance

WHEN OFF-THE-HIGHWAY trucks used in open-pit mining are properly maintained, hauling costs do not increase with their age, according to R. S. Sanford, in U. S. Bureau of Mines Information Circular 7584, on truck haulage at National Lead Co.'s ilmenite-magnetite mine at Tahawus, N. Y. During 1948, it cost $0.1118 per long ton to haul with the four oldest 15-ton trucks and $0.1130 per long ton with the four newest. Two of the newest 15-ton units were bought in 1945 and two in 1947.

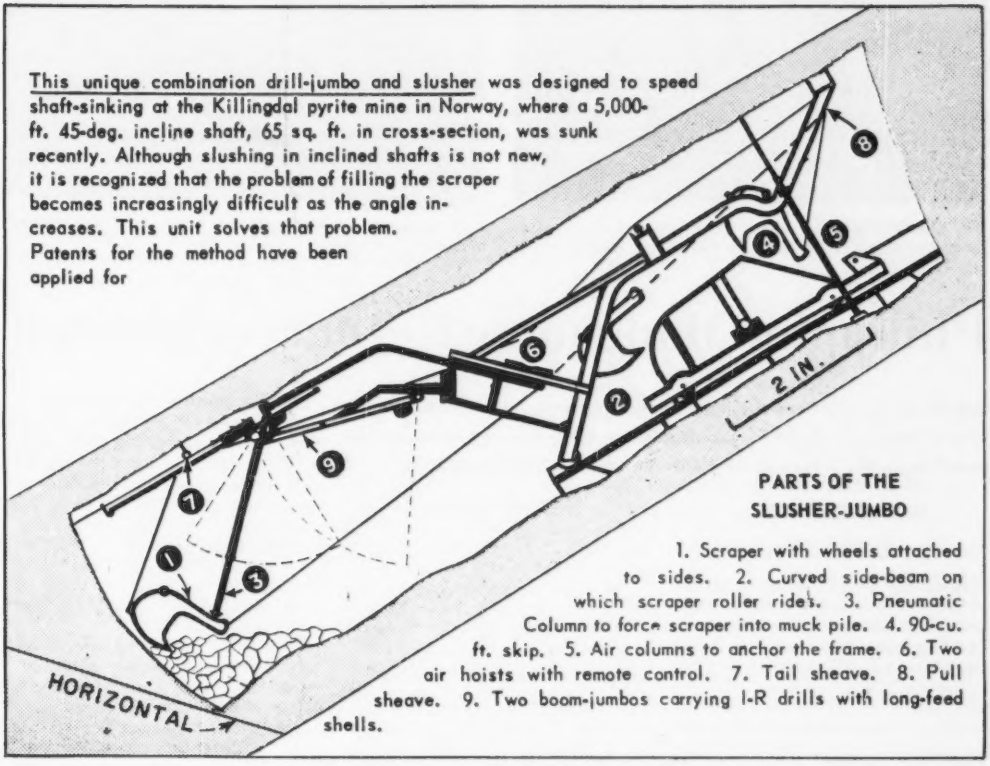
The trend is toward heavier equipment. In 1949 it cost $0.0925 per long ton to haul ore and waste with a 15-ton truck and $0.0743 a long ton with a 22-ton truck.

The weighted average cost of hauling a long ton of ore to the crusher and waste to the dump has been reduced from $0.1159 in 1948 to $0.087 in 1949.

Requirements for efficient low-cost truck haulage are good trucks designed for heavy loads, adequate truck maintenance, smooth roads, and well-trained truck drivers. A correct balance must be maintained between the primary crusher capacity, the number of shovels loading ore, and the number of trucks hauling ore.

The cost of tires is important. Tire companies are making better tires. Mining companies are prolonging tire life by building better roads and maintaining correct tire pressure.

Combination Jumbo and Slusher Speeds Incline Shaft Project


This unique combination drill-jumbo and slusher was designed to speed shaft-sinking at the Killingdal pyrite mine in Norway, where a 5,000-ft. 45-deg. incline shaft, 65 sq. ft. in cross-section, was sunk recently. Although slushing in inclined shafts is not new, it is recognized that the problem of filling the scraper becomes increasingly difficult as the angle increases. This unit solves that problem. Patents for the method have been applied for
2 IN.
HORIZONTAL
PARTS OF THE SLUSHER-JUMBO
1. Scraper with wheels attached to sides. 2. Curved side-beam on which scraper roller rides. 3. Pneumatic Column to force scraper into muck pile. 4. 90-cu. ft. skip. 5. Air columns to anchor the frame. 6. Two air hoists with remote control. 7. Tail sheave. 8. Pull sheave. 9. Two boom-jumbos carrying I-R drills with long-feed shells.

LUDVIG LARSSEN and ERIK WELLE-STRAND*

OPERATING PRINCIPLE of the slusher-jumbo is as follows: The scraper is equipped with wheels which run along the main side beams of the frame. When tension is applied to the pull rope of the hoist, the scraper is carried to the frame and then raised over the skip and dumped as shown. In steeper shafts, a compressed air column, which swings freely in the vertical plane, is used. As the scraper is pulled forward, the head of the scraper is pressed down into the muck pile to facilitate filling of the scraper. Then the air column is detached and the scraper is pulled forward along the floor until the wheels engage the side beams of the frame. Tension is maintained on the pull rope until the wheel of the scraper rests in the bend in the side arms. The pull rope is then slackened, and the scraper swings on the wheels to discharge its load into the skip. Thereafter the tail rope pulls the scraper back to the initial loading position at the face.

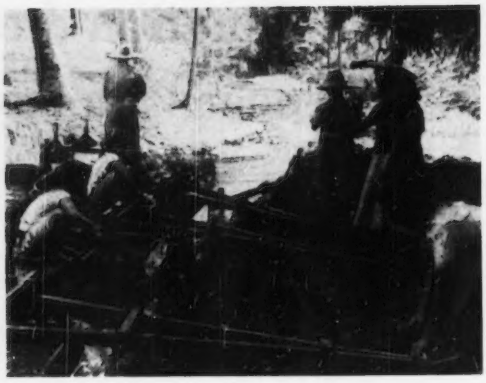
*Mining Engineers, Oslo, Norway.

Unit Serves as Jumbo

Two Ingersoll-Rand air hoists are mounted on a platform which is attached to the frame. This platform is extended to provide room for the slusherman and to serve as a base for two Ingersoll-Rand boom jumbos with long-feed shells. Additional room is provided for a pump and hoses, spotlight, signal equipment, tools, and an extra Atlas rock drill with pneumatic pusher.

Two air columns are attached to column clamps on the main beams. These serve to hold the frame rigidly between back and floor. The operating crew consists of three men.

Astrup & Aubert, a contracting firm of Oslo, has used the same mucking method in a 2,100-ft. penstock shaft at the Aabjora hydroelectric plant. The bore was circular with a 9-ft. diameter and incline angle of 43½ deg. The upper half of the bore penetrated tough quartzite, and was drilled with Coromant tungsten-carbide tipped steel and Atlas pushers. The circular face was drilled with a 33-hole round using a burn cut. Average pull per round was 7.5 ft.



ON SIQUIJOR, June, 1950. Left, crude methods serve for transporting manganese ore from small isolated workings to central trucking station. Right, hand jigs worked by women are used for washing ore.

Philippine Manganese Resources Limited

Bohol and Siquijor are the most promising areas, the author thinks. Ore is found on all the large islands, for the most part in numerous small deposits. Total output is estimated at 312,000 long tons.

S. J. McCARROLL
Douglas, Ariz.

MANGANESE MINERALS are found on all of the large islands of the Philippines, with the exception of Samar. The manganese occurs as individually small deposits that may be numerous in a given area. Exceptions to this condition are found on Siquijor, where continuous bedded deposits are found associated with agglomerates and sandstone, and on Busuanga, where high-grade psilomelane and pyrolusite are found in fractured vein systems associated with jasper.

Although a small amount of manganese was produced before or during the first World War, no further production is recorded until late in the thirties when a mining boom took place in the Philippines. The promotional boom was immediately followed by the war demand which served to support the price of manganese. A good part of the prewar manganese production was sold to Japan, and during the war years when the islands were occupied by the Japanese, they operated several of the properties, notably those on Busuanga, Siquijor, Bohol and Masbate. At the time of the liberation, there were stockpiles of manganese ore at most of the properties being operated by the Japanese. The postwar production figures are misleading to some extent because a large part of the ore then exported represents this stockpiled ore.

The order of importance of the manganese deposits, as evaluated by Boericke and Lim in "Mineral Resources of the Philippines, 1937-1938," places Siquijor as first, followed by Busuanga. The other deposits and their respective locations are: Bani, Camarines Sur; Siec deposits, Illocos Norte; Guindulman, Bohol; Milagros, west coast of Masbate; Makinoy deposit, Central Panay; and Bitulok, Nueva Ecija.

In general, the deposits are of three types: First, the high-grade vein deposits of psilomelane worked on Busuanga, and the showings on the island of Culion. Second, the medium to low-grade manganiferous sandstone deposits of the Siquijor type. Third, the pyrolusite nodule deposits, such as those at Guindulman and Anda, Bohol, and at Bay Bay, Leyte.

The deposits are all associated with either metamorphic or igneous rocks. Although there is some evidence of hypothermal origin, especially in the Busuanga deposits, it is my opinion that the major portion of the deposits were formed by the redeposition of minerals after solution from the numerous igneous rock during normal weathering.

In some places the deposited manganese ore has undergone intense metamorphism after deposition, as in Busuanga. The hard ore found in Panay and in Nueva Ecija also suggests consolidation by metamorphism as well as silicification. The nodule deposits of Guindulman and Anda, Bohol, and of Bay Bay, Leyte, are examples of the residual detrital type where enrichment has taken place in the topsoil as the bedrock weathered. Precipitation of manganese has taken place throughout the topsoil in the form of nodules varying in size from minus-20-mesh to about 1 in. in diameter. It is also reported that larger lumps probably of detrital origin make up a good portion of the production.

Estimated Production of Philippine Manganese, 1936-1950

	Value, Dollars	Estimated Tonnage Long Tons
1936	$ 23,578.00	2,000
1937	247,775.50	20,000
1938	549,385.00	50,000
1939	301,311.50	40,000
1940	710,194.50	60,000
1941	790,449.50	55,000
1942-1946	War years, no data	
1947	198,480.00	15,000
1948	420,476.50	35,000
1949	472,097.00	35,000
1950*		
First Quarter	53,687.50	1,500
TOTAL	$3,767,435.00	313,500

*Production estimated for 1950 is 30,000 long tons.

As in any region of many small mineral deposits, the surface outcrops or enrichments contain the only commercial ore that can be extracted. This condition has held true in relation to the manganese deposits in the Philippines, and it can be said that the top has been skimmed from most of the known deposits. This skimming and, in many places, depletion of the deposits was carried on with the abnormal conditions of promotional ventures or war.

Investigations which I have made at various properties, at the Philippine Bureau of Mines, and through local people acquainted with the mines, seems to indicate that most of the manganese produced in the Philippines has cost more than the selling price, and that the only successful business in the manganese field has been the buying and selling of the ore. In many cases, small deposits can be worked out by local people using crude methods, and at their convenience.

The success of the Luzon Stevedoring Co. in their manganese operations has been largely due to their facilities for collecting and loading small deposits from widely separated points.

No record exists of manganese production in the Philippines between 1917 and 1935, and the records for the following years at the Bureau of Mines indicates only the value of manganese mineral shipped. In the accompanying table the tonnages have been estimated from the selling price and production data supplied by produeers.

Work on Siquijor

During the years immediately preceding World War II, it is estimated that more than 150,000 tons of manganese ore was produced from the island of Siquijor alone. A good part of this came from underground operations, and the balance from surface deposits and outcrops, after being upgraded by screening and washing. The deposits worked during this period are now exhausted. Although it is known that mineralization continues to depths of 180 ft., the grade of ore drops to about 20% Mn and the ore is of such a nature that it cannot be readily upgraded. All ores on Siquijor are characterized by their low-grade and sandy nature.

A recent survey of Siquijor made by me indicates that possibly 2,000 tons of 43% manganese ore will be produced during 1950 from old dumps and workings close to surface. Some prospecting is in progress and it is possible that worthwhile deposits in previously unexplored areas may be brought into production. Manganese mineralization replacing limestone was observed at Bugang Pisong, which is about 4 mi. west of the large sandstone deposits formerly worked.

The U. S. Geological Survey has had a party on Siquijor for several months making a study and mapping the formations. One of the results should be the determination of the probable source of the manganese minerals.

Bohol Present Chief Source

The largest producing area in the Philippines at present is the island of Bohol. Here a deposit estimated at several million tons is found in the regions of Guindulman and Anda. The manganese minerals are found as lenses and nodules in the soil. The manganiferous soil varies in thickness up to 50 ft. and the nodules seem well distributed. Several thousand test pits have been dug and the average of the sampling indicates about 25% manganese. The soil must, of course, be washed to remove the nodules which assay 46 to 47% manganese.

From January to July, 1950, approximately 10,600 tons of concentrate has been shipped to Japan from Bohol, and plans are now underway to increase the production. As yet no process has been found to treat successfully the low-grade manganiferous shale which is high in silica and alumina and contains about 25% manganese.

Bohol appears to be the only successful manganese operation in the Philippines with prospects for an increase in production in the future. The present import-export controls and tax conditions may influence the policy of the operators to one of steady, small production.

Deposits on Busuanga were examined and found to be high-grade psilomelane and pyrolusite which have been consolidated into extremely hard masses bedded with chert and argillites. The vein systems are often vertical and extremely faulted. The continuity of the vein system can be followed easily but the irregularity of the ore lenses, which may at times be only 1 ft. wide, makes economical underground mining difficult.

Manganese production from Masbate has come from surface showings and enrichments similar to those on Siquijor, although the grade is somewhat higher. Several properties were operated on Masbate before the war and for a short time after it. Only surface workings were operated and, when finally the work was stopped, 25 cu.yd. of waste was being removed for every ton of manganese produced.

In Camarines Sur there are several small deposits which have produced ore running 35 to 40% manganese. At Malapatan some ore has been shipped during 1950; at Sirma several hundred tons was mined but not shipped due to its low grade.

There are small deposits of manganese on Panay. Those examined at Ivisan, Cupiz, were of good grade. In Ivisan village there are apparently about 1,500 tons of large manganese boulders. As no outcrop is found in the area, it is assumed that these are residual and originated from a small bog deposit which was later consolidated and then broken up by erosion.

Several deposits of manganese have been reported in the province of Nueva Ecija, Luzon. Those at Bitulock were examined and, though of shipping grade, are so small and in such a difficult place to get out, that the cost of preparing roads is not warranted.

Existing Law a Handicap

In every instance, with the exception of Bohol and Siquijor, where the problem of manganese production is largely metallurgical rather than one of mining, the deposits are small and widely scattered. Economical operation is handicapped by the lack of roads and high lighterage charges for small shipments. The Philippine Republic Act No. 215, amending Section 81 of the Mining Act to allow claim holders who were without mineral lease at the outbreak of World War II, up until June 1, 1952, to establish their claims, has been a detriment to the mining industry and to new development. Controversies have arisen over the ownership of most of the properties examined. An additional handicap for one who is trying to start an operation is the unpaid labor claims which seem to be always present.

In my opinion, the most promising areas for manganese production are the islands of Bohol and Siquijor. A long period of development and rather large investment for metallurgical treatment facilities will be necessary to produce manganese of the 45%-48% grade now in demand by the American market.

Calculate Classifier Data

If you can't check circulating loads and efficiencies by actual measurement, you can use this reliable new method based on screen analyses.

FRED C. BOND*
Milwaukee, Wis.

PRESENT METHODS of calculating: 1, the efficiency of a separation based on size; 2, percent circulating load in closed-circuit operations, are not completely reliable. This article proposes a new method that should furnish a more valid criterion of such routine separation operations.

The efficiency of separation of a screen, hydraulic or mechanical classifier, or an air separator is usually calculated by a formula based on a selected particle size. This is true also of circulating load calculations.

The difficulty arises in the fact that the results of these calculations depend on the size chosen, which is, itself, not an easily definable figure. Thus, two calculators, working independently, but on the same operation, can come up with different values for efficiency and for circulating load.

The new method does not depend on selection of any particular mesh size or sizes. It uses rather the graphs of the size distribution analysis of the products involved in the separation.

The Old Method

Circulating load is best determined by actual tonnage measurement. It may be calculated in wet grinding by the dilution of the various products.[1] However, in many cases these measurements cannot be conveniently made, and the circulating load is calculated from particle size distribution measurements.

The efficiency of separation obtained in a classifier, screen, or air separator is also usually calculated at one or more selected particle sizes. The method of calculation is the same for both closed and open circuit operation.

Table I—Screen Analyses of Sample Ore Values Are Percent Passing Each Size

Mesh	Screen feed (f_c)	¼-in. Screen Overs. (t)	¼-in. Screen Unders. (c)	3/16-in. Screen Overs. (t)	3/16-in. Screen Unders. (c)
¾-in.	100.0			100.0	
½-in.	99.6	100.0	100.0	99.3	
⅜-in.	94.0	82.7	98.1	88.2	100.0
3	78.4	29.8	96.9	51.0	99.9
4	61.5	1.2	83.7	17.4	99.8
6	48.4	0.3	61.0	0.7	88.1
8	39.9		50.7		70.4
10	32.9		41.9		57.1
14	27.1		34.5		46.5
20	22.5		28.8		38.3
28	18.2		23.5		30.8
35	14.9		19.4		25.0
48	12.1		16.0		20.2
65	9.7		12.9		16.3
100	7.5		10.1		12.6
150	5.7		7.7		9.5
200	4.4		5.9		7.3

If the following symbols are used:

	Weight	% Passing any Sieve n	Size 80% Passes	% Passing Size P
New Feed to Circuit	F_a	f_a	F	F_P
New Feed + Classifier Returns	F_b	f_b	B	B_P
Mill or Crusher Discharge	F_c	f_c	D	D_P
Classifier Coarse Product	T	t	R	R_P
Classifier Fine Product	C	c	P	80

and the new feed enters the mill or crusher, the percent circulating load is:

$$\% \text{ CL} = 100\text{T}/\text{F}_a = 100(\text{c} - \text{f}_c)/(\text{f}_c - \text{t}) \quad \ldots\ldots (1)$$

If the new feed enters the classifier, the percent circulating load is:

$$\% \text{ CL} = 100\text{T}/\text{F}_a = 100\,\text{F}_c/\text{F}_a = 100(\text{f}_a - \text{f}_b)/(\text{f}_b - \text{f}_c) = 100(\text{c} - \text{f}_a)/(\text{f}_c - \text{T}) \quad \ldots (2)$$

Classifier efficiency has been defined as the ratio, expressed as percentage, of the weight of classified material in the fine product to the weight of classifiable material in the classifier feed.[2] Thus, where the new feed enters the mill or crusher, the classifier efficiency separating at any sieve size n is:

$$\% \text{ Eff.} = 10{,}000\,\frac{\text{C}}{\text{F}_c}\,\frac{(\text{c} - \text{f}_c)}{\text{f}_c(100 - \text{f}_c)} \quad \ldots\ldots (3)$$

If the new feed enters the classifier, the efficiency is:

$$\% \text{ Eff.} = 10{,}000\,\frac{\text{C}}{\text{F}_b}\,\frac{(\text{c} - \text{f}_b)}{\text{f}_b(100 - \text{f}_b)} \quad \ldots\ldots (4)$$

Vibrating screens or any other size separating device may be substituted for classifiers in all these equations.

The results obtained from equations (1), (2), (3), and (4) are

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[1] Fred C. Bond: "Determination of the Circulating Load in a Wet Closed-Circuit Grinding System"; *Mining and Metallurgy*, November, 1937.

[2] Taggart: *Handbook of Mineral Dressing*, 19, 199-202.

Accurately By New Method

Table II—Comparison of New and Old Methods of Calculation Based on Data of Table I

Vibrating Screen Opening Size	¼-in.	3/16-in.
Vibrating Screen Opening Size—Microns	6350	4760
Values Determined by Log—Log % Passing Plot		
F (Feed Size—Microns 80% Passes)	6700	6700
P (Fine Product Size—Microns 80% Passes)	4450	2750
R (Coarse Product Size—Microns 80% Passes)	9000	8700
D_p (% Screen Feed Passing Size P)	61.0	44.0
R_p (% Screen Oversize Passing Size P)	1.0	0.3
New Method		
Separating Size in Microns	5200	3750
Percent Efficiency at Separating Size	87	91
Percent Circ. Load (From Equation 5)	31.7	82.4
Old Method		
Percent Circ. Load at Mesh Size (From Equation 1)		
⅜-in.	36.3	103.5
3 mesh	38.1	78.5
4 mesh	36.8	86.9
6 mesh	26.2	83.2
Percent Efficiency at Mesh Size (Equation 3)		
⅜-in.	53.3	52.3
3 mesh	79.0	71.1
4 mesh	68.6	86.6
6 mesh	40.0	86.7

The calculations are based on the assumption that the screen oversize is returned to a crusher in closed circuit with any specified amount of new feed.

dependent upon the mesh size chosen for the calculations. The calculated circulating load usually varies considerably at different mesh sizes, and there is no accepted method of reconciling the differences. The usual procedure is to make the calculation for each mesh available, throw out any values which are too widely divergent, and average the rest. Two calculators working from the same data may obtain different circulating loads.

The calculated classifier or screening efficiency is completely dependent upon the mesh size selected, so that comparative efficiencies on different installations may be widely divergent.

New Method

A new method has been developed which does not depend upon the selection of any particular mesh size or sizes, and consequently yields more consistent results. Different calculators will obtain the same circulating load by this method, and the classifier separating size is exactly defined, so that classifier efficiencies and separating sizes on different installations can be compared directly.

The new method is based upon particle sizes, as determined from graphed size distribution curves.

In calculating the percent circulating load by this method, we use the suggestion of Professor Taggart that screen analyses be evaluated in terms of the size which 80% passes.[3]

The size in inches or microns which 80% of the final product of the grinding circuit, or the classifier fine product, passes is designated as the product size *P*, and the circulating load is calculated from the percentages of the different products which pass this size.

If the new feed enters the mill, or crusher, the percent circulating load, by comparison with equation (1) is:

$$\% \text{ CL} = 100\ T/F_n = 100(80 - D_p)/(D_p - R_p) \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

If the new feed enters the classifier the percent circulating load, by comparison with equation (2), is

$$\% \text{ CL} = 100\ T/F_n = 100\ F_c/F_n = 100\ (F_p - B_p)/(B_p - D_p) = 100\ (80 - F_p)/(D_p - R_p) \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The reduction ratio in the circuit is F/P.

The separating size of the classifier, screen, or air separator is precisely defined as the size at which the percent passing in the classifier fine product equals the percent cumulative retained in the classifier coarse product; and the classifier efficiency is the percent cumulative retained in the classifier coarse product at the separating size. Both of these quantities are readily found by graphs of the screen analyses and do not require calculation. They are independent of any arbitrary mesh size selected and permit direct comparisons between different classifying and screening operations. The actual evaluation of the separating size and efficiency in this manner should make comparisons of the performance of separating equipment more precise.

How It Works

A recent laboratory screening test on a cobalt ore from Morocco was selected to illustrate the application of these equations. The crusher ore was fed dry to vibrating screens with square openings of ¼ in. and 3/16 in. The screen analyses obtained were as shown in Table I.

The values listed in Table II were calculated from the equations and screen analyses.

The example shows that the percent circulating load and the percent efficiency calculated by the old method show considerable variation at the different mesh sizes. The percent efficiency of separation depends upon the mesh size selected, and when plotted it is seen to have a maximum at the separating size found according to the new method. The new method supplies definite values for the performance of a separator which are independent of any mesh size selection, and should yield comparable results.

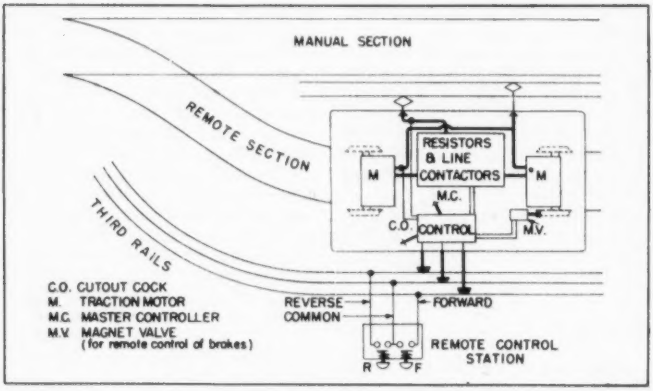
The above equations are applicable to all size separations of materials whose various minerals or constituents have the same specific gravity. When minerals of different specific gravity are present, the separation results are modified accordingly, and comparison of separator performance operating on different materials become uncertain. However, the separating size and percent efficiency at that size are still valid criteria for the material in question.

[3] A. F. Taggart: "New Units of Crusher Capacity and Crusher Efficiency," AIME, T.P.1297 (1941).

Handling Materials by Remote-Controlled Locomotives

This application of remote control at Colorado steel mill is worthy of consideraton by mining industry at large

ENTERING mill to load. Right, contact shoes are sliding on to side rails used for remote control which run parallel with the track.



PUSH-BUTTON CONTROL which is used for spotting the cars at the loading dock of the mill is illustrated in this schematic diagram.

W. J. BOYER

Locomotive Engineering Division
General Electric Co.
Erie, Pa.

FOR OVER A YEAR NOW, the Colorado Fuel and Iron Corporation, located at Pueblo, Colo., has had two 8-ton locomotives running part of each day on a mill siding without an operator. This has been successful and has attracted wide attention.

These locomotives are handled by remote control from an operating station on a loading platform. The control station is equipped with two palm-operated push-buttons; one for moving the locomotive forward and one for reversing. The operator handles the locomotive and cars as a child handles the operation of a toy train around the living room floor. It's that simple!

While one locomotive is being remotely operated by a dockhandler, the other locomotive with its train of cars is proceeding to a wire mill where the load is deposited before returning to the siding. During this run each locomotive is operated manually by one man, who alternates between the two locomotives.

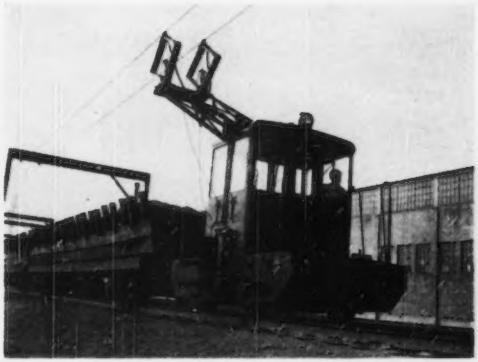
This remote control method of locomotive operation saves both time and money. The cars are loaded more rapidly because the loader can accurately control the positioning of his car by push-button. One operator can easily handle both locomotives on the run to the mill.

The company has had excellent results in the use of these two locomotives for handling large round bundles of steel rod about 4 ft. in diameter. These bundles are loaded from a dock at the rear of the building in which the rod is manufactured. They must be transported several hundred yards from this loading dock to a wire mill. Let us begin the movement cycle by assuming that one of the locomotives is standing on the siding next to the loading dock; the locomotive has no operator inside and its trailing cars are empty.

One of the two loaders first maneuvers the train into position and then they begin loading the cars. The two men are working within a few feet of each other, as shown in the illustration. As a result, they are able to co-ordinate their respective operations smoothly and efficiently. When a section of each car is filled, it is necessary to move the train for additional loading. The man handling the locomotive controls merely presses the forward push-button; the locomotive advances and is halted at the desired spot when the push-button is released. If he desires to back the train up, the push-button operator presses the reverse button.

This procedure continues until all of the cars are completely loaded. Prior to this time, however, the other locomotive and cars have been returned from the mill by the locomotive operator. He has pulled this

CARS ARE SPOTTED for loading at dock by push-button control operated by loader at left.



LOADED TRAIN being removed on main line by manual control while another train remains behind for loading.

second train on the siding behind the first train, and has set the locomotive controls for remote operation, with the three contact shoes riding along the three rails used for the remote-control circuit.

When the first train is ready to leave, the locomotive operator enters the cab and moves the fully-loaded train away from the dock to the mill by using the standard locomotive controls. Then the movement cycle starts all over again with the push-button operator maneuvering the second (now empty) train into position along the platform for reloading.

These two remote-control locomotives were designed and built by General Electric at its Erie, Pa., works. This application was new and naturally required a custom-built job, especially from the control standpoint. A thorough study by the company's locomotive control engineers resulted in a relatively simple control system that is successfully fulfilling the requirements. The accompanying basic diagram shows the connections between the items of electrical equipment that make up the system. A 230-v. dc. source of power is used. Two trolley wires above the main track furnish this external power, which is transmitted to the locomotive by means of a pantograph with two sliders that ride along the wires. Two 250-v. dc. traction motors permanently connected in parallel supply the motive power directly to the two axles through single-reduction gearing.

When one of the locomotives is taken on the siding alongside the loading platform, three shoes are extended on the side to make contact with the three rails. Before leaving the locomotive, the operator must do two things to allow for remote operation: First, he must set the master controller in the remote position and then throw the motorman's double cutout cock to the remote position also.

When these simple steps are made, the locomotive is ready for remote control operation and the dock operator has only to manipulate the forward and reverse push-buttons. Operating the buttons automatically supplies power to the locomotive and also applies and releases the brakes. The confusion often found in the use of hand signals is eliminated, and the loaders are able to spot the cars easily.

The Locomotive

Each of these locomotives weighs 8 tons and operates on standard 56½-in. gage track. The operator's cab is center-mounted and the pantograph is offset to one side, as shown in the illustration, to allow full use of the cranes for loading.

These locomotives have many built-in, specially-designed features. Manual acceleration is governed by a current limit and is automatic up to any selected notch. Remote control acceleration consists of two steps with extra speed in the second step, under control of a time delay relay.

A very important safety feature is that the manual control always overrides the remote control. It is impossible to operate both controls at the same time. This fact prevents damage to the system that might possibly occur if the cab operator and the dock operator should simultaneously attempt to run the locomotive.

Another notable feature is that the three side rails are normally "dead." Power is on the rails only when the cab operator has set the controls for remote operation. When the dock operator presses one of the push-buttons, the circuit is closed through the rails.

Also, the master controller and motorman's double cutout cock are electrically interlocked, so that it is necessary to have both of them set in either manual or remote position to have either type of locomotive operation possible. Having one in the manual position and the other in the remote position automatically prevents any movement.

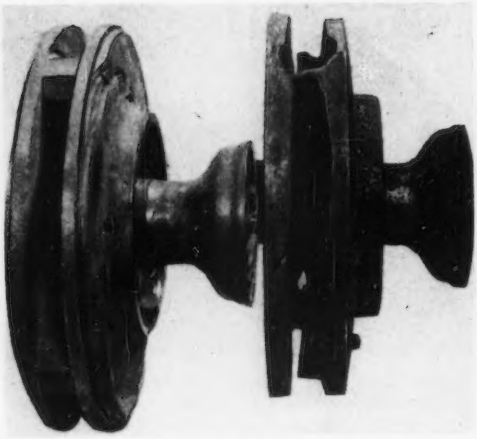
In addition, the cab operator has no need to concern himself about the brakes before he leaves the locomotive. When he throws the double cutout cock, the brakes are automatically set.

Similar applications of remote control for locomotive operation are feasible and can be made in a great number of cases. Other plants can readily use this precise type of control to their advantage.

Because of the resulting increase in speed and precision with remote control, more efficient production can be realized and time saved.

The more efficient utilization of manpower effects a definite saving in labor costs.

In fact, the use of remote-control operation of locomotives lends itself so well to industry in general that virtually any manufacturing plant could benefit by adopting this type of system. For example, regardless of the product made, remote control operation offers a much better means of handling goods on loading platforms. Here is an advance in the methods of materials handling that is worthy of thoughtful consideration by industry at large.



ORIGINAL PUMP ROTORS, of Crystolon (left) and cast alloy (right), gave four weeks' and one week's wear.

PUMP PARTS, shown above and in block of four pictures opposite, are those currently in service at the . . .

Pump Parts Last Longer With Silicon Carbide

J. J. BURNS

Superintendent of Mills
Edwards Division
St. Joseph Lead Co.
Balmat, N. Y.

THE ORE at the St. Joseph Lead Co.'s zinc mine at Balmat, N. Y., is very abrasive. For this reason, during past years we have tested numerous alloys that have given promise of extending the life of our pump parts.

Prior to 1935, we were getting the best economy from a nickel-chromium alloy. From 1935 to World War II we found rubber-covered pump parts to be most economical, with the exception of rubber-covered impellers. The latter were unsatisfactory because the rubber under centrifugal force did not give us sufficient life to justify its use.

A few years after World War II ended we learned that some of our friends in Europe were using a mixture of quick-setting cement and silicon carbide as a wear-resistant material for pump parts, the ground silicon-carbide particles replacing the sand ordinarily used in a cement mixture. This sounded very interesting. Tests subsequently made by us were encouraging. After testing the above mixture, however, it became evident that to secure maximum results, an improved bond or matrix was essential. We asked the Norton Co. of Worcester, Mass., to develop an improved ceramic bond.

The Norton Co. was interested in the idea and developed a special ceramic composition which provides the strong and dense bond required.

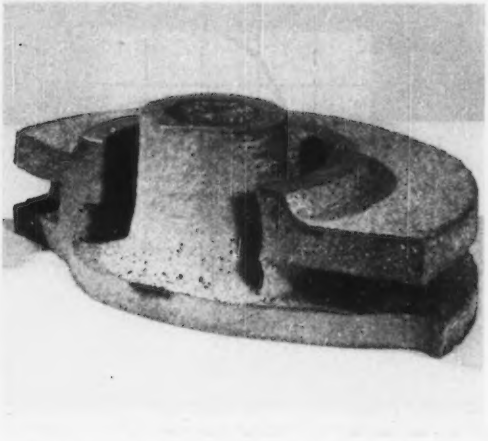
To attain maximum density and hardness, the Norton Co. uses the silicon carbide in several particle sizes and has developed a body that contains as little as 5 to 8% of pores. This composition wears well because the dense texture keeps a maximum of silicon-carbide particles and a minimum of matrix exposed to wear. Erosion is so slow that remarkable life has been experienced.

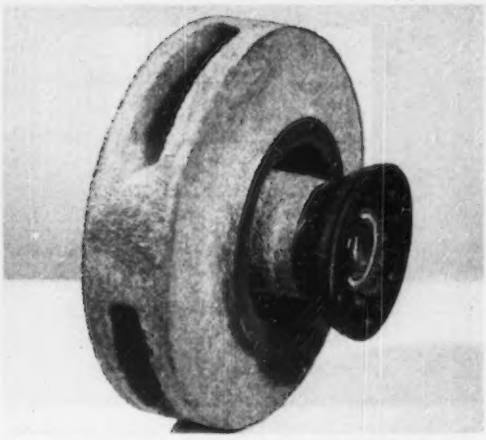
Several changes in the original design have been made as weak points developed during testing. Initially, metal side plates and metal hubs were used on the runner but the differential in wear between metal and silicon carbide was so great that all exposed metal has been eliminated with the exception of a replaceable expeller on the runner. The original designs are shown in photograph in upper left and the current designs in the five pictures adjoining.

The original Norton pump housing is shown on opposite page. This metal housing, lined with the Norton Co.'s silicon-carbide-ceramic material, has been in service for

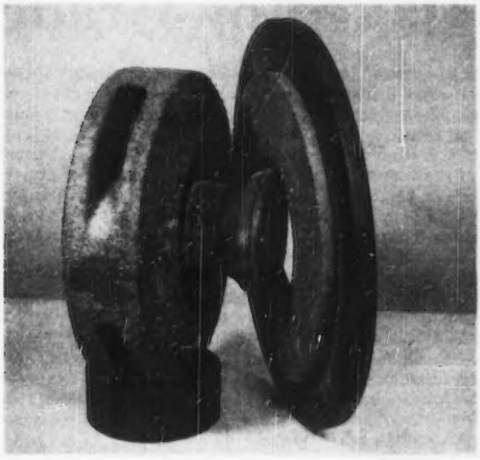
Wearing Life of Pump Parts to Date, in Days

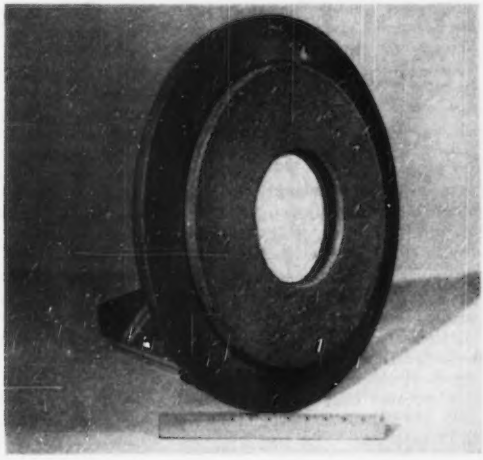
Pump No.	Runner			Follower Plate			Case		
	Metal	Rubber	SiC	Metal	Rubber	SiC	Metal	Rubber	SiC
13	6	..	54	72	...	118	..	...	...
4	20	..	177	60	279	626	61	345	520
3A	20	..	140	41	102	140	..	...	...
5A	21	..	...	49	196	302	..	...	...
6	28	..	52	100	...	71	..	...	...





concentrator. For wear resistance a mixture of silicon carbide and a strong and dense bonding ceramic material of special composition has been employed. The wearing life has been greatly increased, as indicated in table.

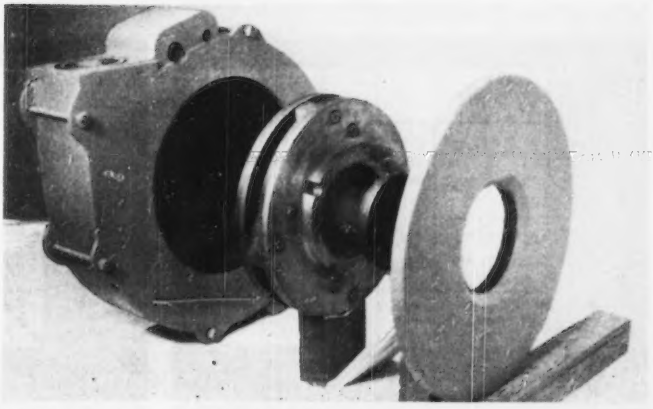




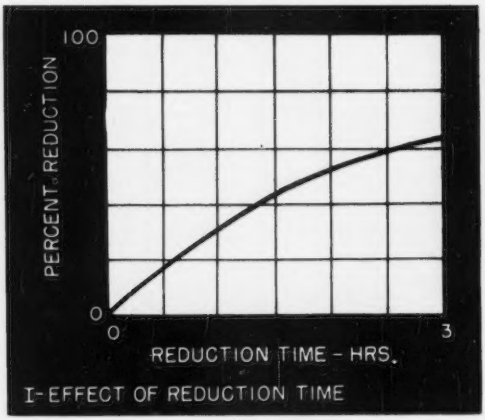
520 actual operating days. To date it shows very little wear, as against an average life of 61 days for the former all-metal housing. A comparison of the wearing life of some of the pump parts are given in the table.

The silicon-carbide parts in the table are *still* in service, with the exception of No. 13 follower plate. For unknown reasons this plate had a life of 118 days only.

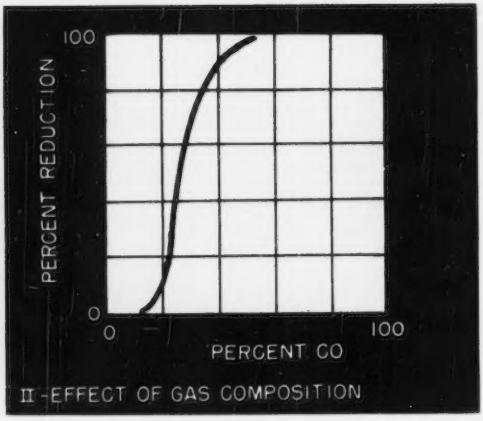
Although, for obvious reasons, we have not repaired or patched the pump parts being tested, one great advantage in using the material described is that, when wear does occur, a mixture of cement and silicon-carbide particles can be troweled on the worn parts and their life lengthened indefinitely by this means.



ORIGNIAL METAL PUMP HOUSING, lined with silicon-carbide ceramic material, has been in use 520 operating days, against 61 for all-metal housing.



I-EFFECT OF REDUCTION TIME



II-EFFECT OF GAS COMPOSITION

Experiments in partial reduction (SnO_2 to SnO) in a controlled atmosphere

New Process May Make Low-Grade

COLIN G. FINK
Professor Emeritus
HOWARD J. STRAUSS
Graduate Student
Chemical Engineering Dept.
Columbia University

CONSIDERING FUEL ECONOMY and quality of product, preliminary cost studies indicate that a partial reduction leaching process can compete favorably with thermal smelting in producing tin. Moreover, the new process can treat ores profitably which are too low in tin value to be smelted.

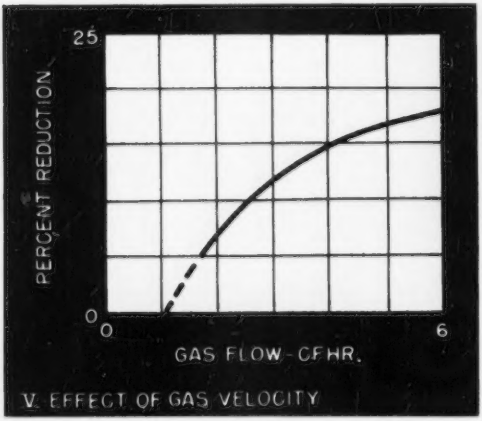
Approaching depletion of high-grade deposits has directed attention to important low-grade reserves which have proved difficult to concentrate. Insolubility of stannic oxide (SnO_2) in aqueous solvents has long been the stumbling block, consequently pre-treatment of the ore to increase tin solubility was indicated as the line of investigation. Two previous main lines of attack, chlorination and treatment of alkalies, were demonstrated to be technically feasible but economically unsound processes.

Taking advantage of the fact that stannous oxide (SnO), unlike the higher oxide, is very readily soluble in a large variety of aqueous acids and alkalies, the authors have studied a new approach to the leaching problem, based on a partial reduction of the SnO_2 (of the ore, roasted ore, or concentrate) to the stannous state, and subsequent extraction of the tin values by a suitable leach solution, such as sulphuric acid. To do this, a thermal reduction in a controlled atmosphere was proposed, in which the desired degree of reduction could be obtained by suitable combinations of reducing and oxidizing gases in the furnace atmosphere. Thus the reduction of SnO_2 could be made to proceed in two distinct steps,

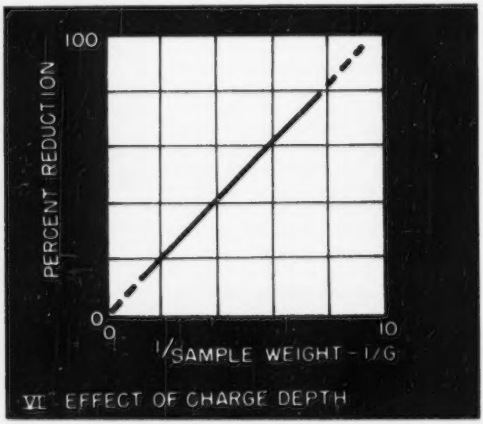
$$SnO_2 + CO \rightarrow SnO + CO_2$$
$$SnO + CO \rightarrow Sn + CO_2$$

simply by using varying ratios of CO and CO_2 in the furnace atmosphere.

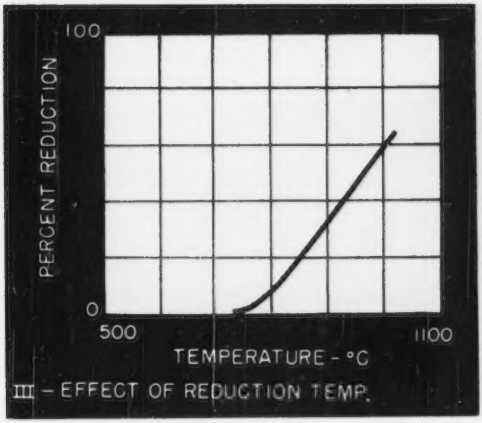
Thermodynamically, the equilibrium conditions at which the re-



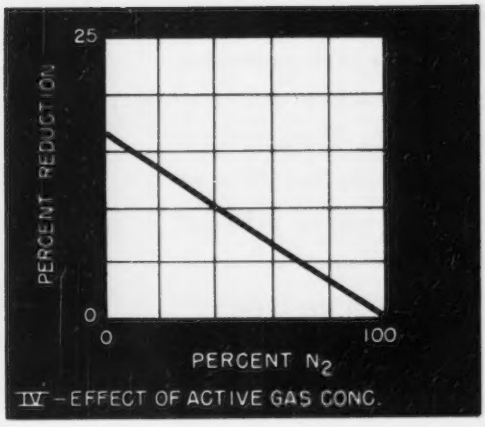
V. EFFECT OF GAS VELOCITY



VI. EFFECT OF CHARGE DEPTH



III – EFFECT OF REDUCTION TEMP.



IV – EFFECT OF ACTIVE GAS CONC.

before leaching, show that . . .

Tin Ore Profitable

duction of SnO_2 to SnO, without any reduction to Sn, is theoretically possible, can be evaluated from available free energy data. Fig. 7, based on such data, indicates that above 500° C. the minimum CO concentration in the furnace atmosphere (consisting of CO and CO_2) required for the reduction of SnO_2 to SnO, is less than that required for the reduction of SnO to Sn. Thus, for example, a gas containing 11% CO (and 89% CO_2) has a sufficiently high CO content to reduce SnO_2 to SnO, but not high enough to reduce SnO to Sn (at 800° C.).

Experimental Results

Having established the theoretical feasibility of a partial reduction process, we undertook a long series of experiments to study the reduction rates. For these experiments, chemically prepared SnO_2 and SnO were subjected to carefully controlled reducing atmospheres, under closely controlled physical conditions, in a suitably heated silica combustion tube. Results of these tests are condensed (above).

Furnace atmosphere was 25% CO and 75% CO_2 in all cases except II and IV. Reduction temperature was 800° C. in all cases except III, and the reduction time was ½ hour in all cases except I. The ordinates represent the percentage of oxygen originally present which was removed during the reduction. Thus a complete reduction of all the SnO_2 to SnO would be reported as a 50% reduction.

Important results of these tests were that the desired reduction (SnO_2 to SnO without reduction of SnO to Sn) could be achieved at reasonable rates, and unless the reduction rates were so high as to accentuate local effects, the reduction of SnO to Sn did not take place until practically all the SnO_2 had been reduced to SnO.

Results of these studies were then translated into larger scale operations (charges of about 1 lb.) on actual ores and concentrates. High sulphide ores were given a roast prior to reduction. We found that the application of controlled atmosphere reduction to these ores resulted in solubilizing better than 90% of the tin values from a wide variety of high and low grade, sulphide and oxide, ores and concentrates.

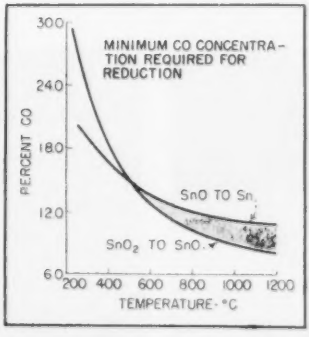


FIG. 7—Shaded area between curves indicates atmosphere and furnace conditions required to reduce SnO_2 to SnO without reducing SnO to tin.

Although we tried reduction atmospheres consisting of other gaseous combination with success, industrially the CO-CO_2 system offers many advantages, such as good fuel economy (particularly as compared to present total reduction smelting practice), ease of establishing and controlling gas compositions, and low cost.

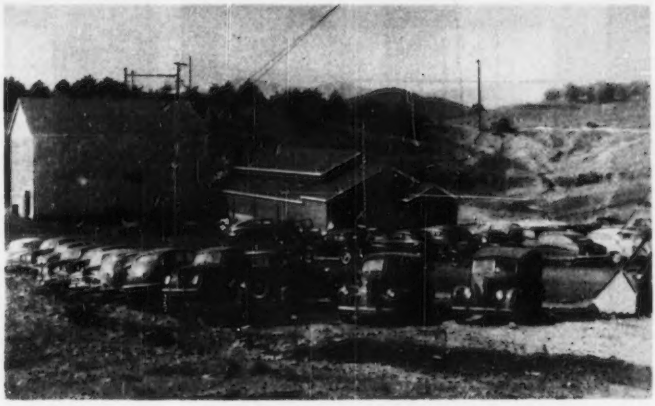
Partial Reduction Preferred

We should point out that proposals have been made, and indeed studied, for completely reducing the ore and leaching the tin from the resulting tin-slag mixture. It was found, however, that the tin from such a process dissolved only with considerable difficulty, particularly as compared to the ease with which SnO from partially reduced ores, dissolves. (In this connection, the physical condition of the reduced ore is important, the partially reduced ore remaining granular and free-flowing, while the totally reduced ore was agglomerated and very dense.) Furthermore, the partial reduction process requires far less fuel than total reduction processes. Lower operating temperatures are feasible, gas leaves the system only as CO_2, and, of course, only half the stoichiometric quantity of CO is required.

All in all, quality of product and relatively low cost make this process an attractive method for treating low-grade tin ores and concentrates.

If well planned, it will give a company's mine employees added comfort and personal pride. The cost for a crew of 100 to 150 men need not exceed $150 per man, Mr. Weaver estimates.

LAMAR WEAVER
Superintendent of Mines
Tennessee Copper Co.
Ducktown, Tenn.

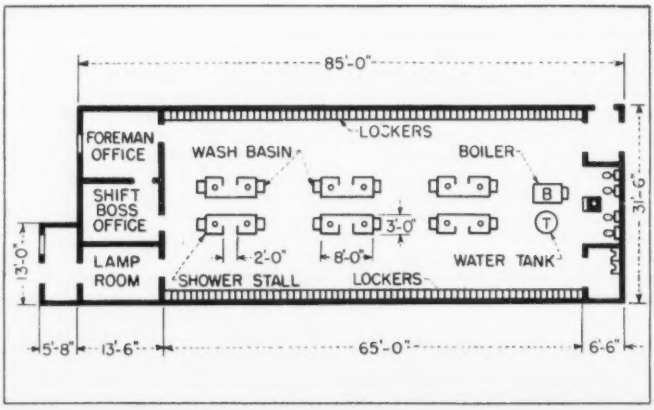


BOYD CHANGE HOUSE stands close to hoist building. Man shaft is to right of parking lot for miners' cars. Floor plan of change house is shown below.

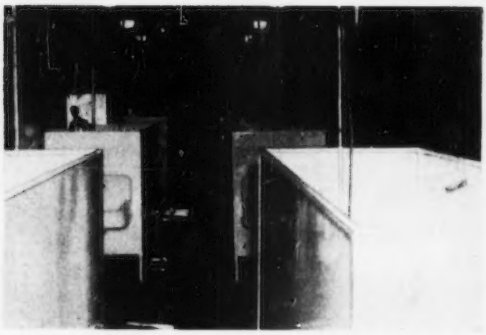
The Change House

THE CHARACTER of the change house provided for a mine crew has much to do with the attitude of the men toward the employer. Acting upon this belief, the Tennessee Copper Co. built two small mine change houses adjacent to the man-shafts of the Calloway and Boyd mines, near Ducktown, Tenn. These buildings were designed for serving a crew of 100 to 130 men with low initial cost without sacrificing outside and inside attractiveness, comfort of the users, or low maintenance cost.

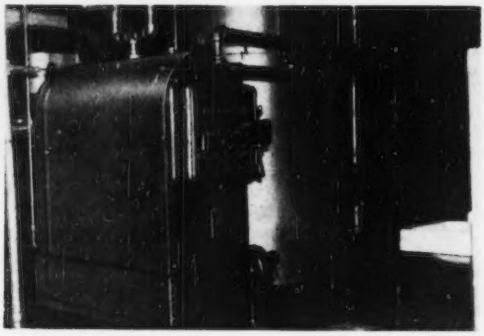
The Calloway change house, the first of the two to be erected, was built in 1944. This building has a front and rear door. The front faces the shaft and has an entrance hall, lamp room and two offices for the foremen. The two rooms used for changing are separated by a brick partition wall. The section under the high roof (shown in the exterior view) is used for hanging the work clothes on baskets sus-



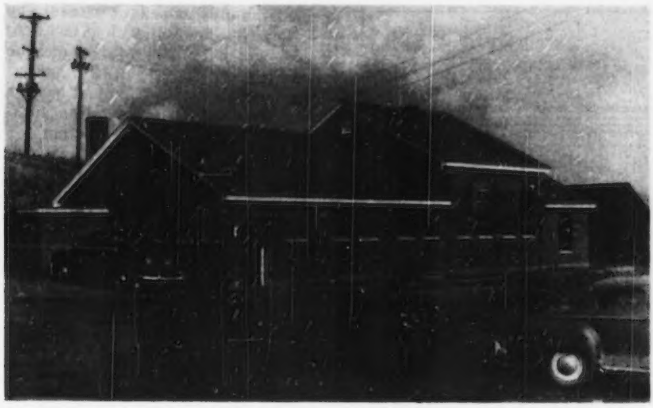
Inside the Boyd Change House



LOOKING DOWN the walkway between the shower stalls. Note the wash basins on the ends of the stalls.

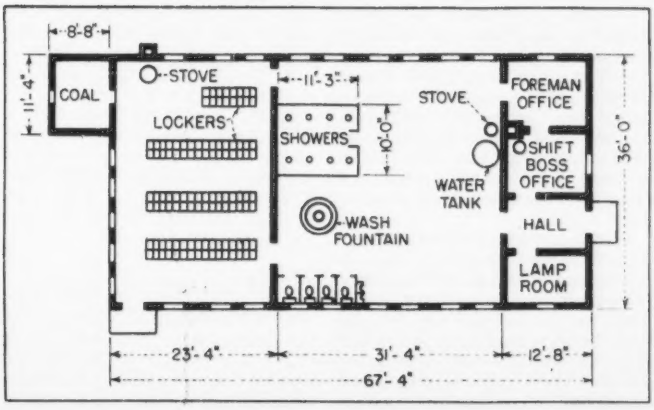


HEATING FURNACE and hot-water tank close up. This equipment may also be seen in the picture at the left.



CALLOWAY CHANGE HOUSE differs from that at the Boyd, both in exterior design and in its floor plan. The latter also provides for efficient changing.

Can Build Morale



pended by chains. The clothes are raised to clear the floor by 7½ ft. In the same room are the showers, Bradley wash fountain, toilets, heating stove and hot water tank. This room is also provided with sufficient movable benches for use while changing clothes and for seating the crew for conferences, such as the regular weekly safety meetings.

The other room contains metal lockers for clean, or street, clothes. This room also is heated by a coal-burning stove. The exit is near the car parking lot. The floor is all concrete, the walls are of brick. Ceiling material is sheetrock overlaid with rock wool. For the roof, composition asphalt shingles on 1-in. tongue-and-grooved pine sheathing are used.

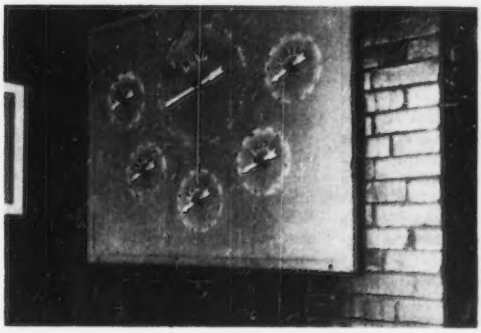
A Different Layout

In building the Boyd change house, similar materials have been used, but the layout is different. The floor area is about the same. Although less conventional than that of the Calloway, the arrangement at the Boyd is popular because of the improved heating system and efficiency for quick change. The change house is more easily supervised and maintained.

This change house was built in 1948. Cost of building and equipment complete was $16,700.00. This total is broken down as follows:

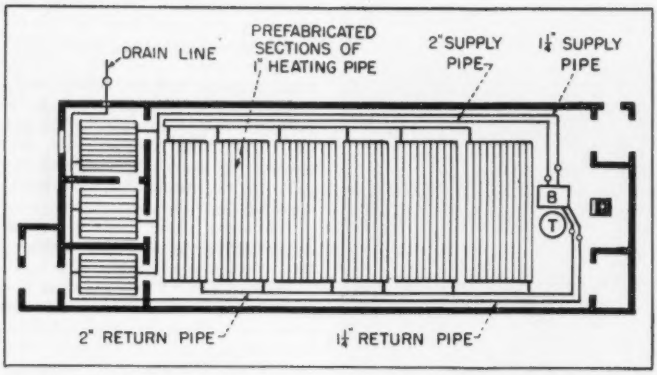
Excavation	$ 500.00
Concrete floor and wall foundation	2,150.00
Heating system	2,200.00
Building, with lighting	10,000.00
Lockers and hangers	1,000.00
Plumbing and showers	850.00
	$16,700.00

The front entrance faces the



THESE SAFETY RECORD clocks, one for each of the company's five mines are in the entrance rooms.

LAMP-CHARGING RACKS adjoining change room are just inside entrance. Miners put lamps on thmeselves.



FLOOR RADIATION for heating change house is provided by laying prefabricated sections of piping in concrete floor and pumping hot water through them.

shaft and car parking lot and is therefore the only one used. A well-lighted room for the bulletin board precedes the cap lamp room, as the floor plan shows. Both rooms are conveniently situated for the miners.

At the Boyd, the change house is heated by floor radiation. Hot water is pumped through a series of pipes laid in the concrete floor. Two small electrically-driven centrifugal pumps force the water through these radiators. One serves the offices and a separate one the change room, inasmuch as the temperature requirements of the two areas vary by 12 to 15 deg. A temperature control thermostat is located in the office section and another one near the center of the change room, which functions to control the circulation pumps. The oil burner of the furnace is controlled by the furnace water temperature. The bath water is heated through coils independently of the water in the furnace that heats the building.

The temperature distribution throughout the building is excellent. During cold weather the rooms are very comfortable for bathing and for changing clothes, possibly because the temperature of the floor and other parts of the building are near body temperature, and there is a noticeable lack of air currents.

How the Heating Pipes Were Installed

The procedure in installing the heating pipe network was as follows: After the excavation was completed, the foundation for the concrete wall was constructed. A sub-floor base of coarse crushed slag was laid level. The water pipes were put in position, spaced about 2 in. above sub-floor level, and welded. A test with water pressure at 100 lb. was made to prove the strength of the welding and piping before placing the concrete floor. Pipe-radiation sections were prefabricated and tested for leaks. Radiators are made up on a heavy frame to prevent welding-stress bends, the 1-in. pipes being welded to the 1¼-in. headers. One-inch holes were drilled in the 1¼-in. header pipes and the 1-in. pipes connecting with them were cut on a slope to approximate a face fit for welding. This procedure minimizes field weldings.

Each shower stall at the Boyd has two shower heads. Wash basins are located on the ends of the stalls. The stalls have a walkway at the back and an opening on the side near the changing seats facing the wall lockers. Showers are spaced to save steps for the men when changing. Twenty-two locker spaces are assigned to the group using each shower.

Temperature of the bath water is controlled by a thermostatic mixing valve located above the shower stall at a point too high to be reached from the floor. Another feature is the floor control for the spring-closing water valve. The valve is opened by standing on a small wooden mat, one end of which is connected to the valve stem, the other resting on the floor. This is fast, convenient, and insures economical use of water.

Lockers and basket hangers are numbered and the name of the occupant is placed on each locker door. The lockers are 12 in. wide by 15 in. deep and 5½ ft. high. This is large enough to carry all that is needed and discourages extras. The lockers are mounted on a concrete pad, which is part of the outside wall foundation, and is 12 in. above the floor surface. The steel lockers are flush with the wall, this eliminating space at top or bottom for dirt to collect. The hanger for work clothes, in the high section of the building, is in front of the locker, between the fixed bench and shower booth. Each man keeps his locker clean. Inspections are made by a shift foreman bi-monthly, with the workman present to open his locker. Only soap, towels and one change of clothes is permitted in a locker. Lockers are given a monthly wiping with a cloth saturated in turpentine.

The duties of the change house man are as follows:

1. He keeps the electric cap lamps in repair and checks to see that the charger is functioning properly and that the lamps in the racks for charging are in contact. Self-service lamps are used. Each lamp and each rack are numbered and the user's name is on both the lamp case and the rack. This requires only a few minutes at the beginning of the shift.

2. He checks the temperature of the water and of the building.

3. He cleans the floor with a water hose. The shower stalls, of white enamel with a gloss finish, are wiped clean after change time. This cleaning requires about one hour and is done soon after the men are taken underground.

Runs Man Hoist Also

4. At the Boyd it happens that the change-house man operates the man hoist, which is in an adjoining building. A mine and surface telephone is kept in the office so that if anyone wants the cage during cleaning time, he can ring the man and make arrangements.

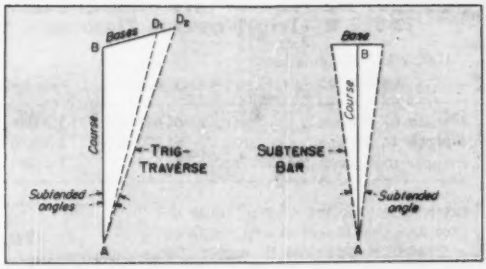
5. The change-house man answers telephones, relays messages and is in readiness to tell who is underground by noting the lockers or the lamp rack.

This change house lends itself to easy supervision because of the compact arrangement and good visibility. The shower booths are only 5 ft. high, so that one can readily see all over the room. The supervisors have a shower in the office corner.

The opinion of the men is that this is the best change house they have ever had. As a result, their cooperation in keeping it clean is excellent.

New Survey Method

- **Is faster and cheaper**
- **Gives 3rd order ground control for aerial mappers**
- **Fills the gap between triangulation and conventional traverse methods.**



NEW TRIG-TRAVERSE METHOD (left) adapts well-known subtense principle (right), but permits a much longer course—two or more miles instead of a maximum of 500 ft.

JOSEPH G. KELLEY[1]

THE TRIG-TRAVERSE METHOD, a modification of the subtense principle, will yield third-order horizontal control at 50 to 75% of the cost of ordinary third-order traverse or triangulation. These savings, as well as faster work, are effected through a reduction of the number of points required, plus a reduction in field party personnel. Moreover, with trig-traverse, third-order vertical data can be obtained at an additional cost of only $1.50 per mile, since the stations are occupied for both horizontal and vertical control.

(In the subtense method, the distance between stations is the altitude of an isosceles triangle with a constant base that is defined by a fixed pair of targets at the forward station. The altitude (distance) is solved after theodolite observation of the apex angle, from the rear station.)

Trig-traverse was developed by Aero Service Corp. for its field survey staff. The method is used to establish the primary ground control for air maps.

Trig-traverse fulfills a need for a horizontal control method that occupies the gap between triangulation and traverse. Triangulation, to be extended, requires intervisibility of several points from any one station. In terrain with few open hilltops this usually demands extensive reconnaissance and the building of observing towers. Costs often become prohibitive if only third-order closures are required.

Over terrain unsuited for easy triangulation, transit and tape traverse usually is used for third-order horizontal control. But the location of traverse is limited by the difficulties of chaining, so traverse follows roads and highways wherever possible. Here, the roads' meanderings and traffic reduce the amount of traverse that can be run in a working day.

Use of the theodolite and subtense bar brings some reduction in control costs. But this method also is restricted by the meanderings of roads, offering merely an occasional easy stream or gully crossing that might not be possible by taping.

In the trig-traverse method, the cotangent of the subtended angle is used to compute the distance of the subtended course. Here the base need not be set perpendicular to the course, but may be established at an angle more convenient for measurement (base angle is observed when instrument moves up from previous station). Instead of the short subtense bar, trig-traverse employs a standardized steel tape, expanding the base measurement up to 500 ft. This makes possible the spacing of stations at intervals of as much as two, three or five miles.

The above drawing is a graphic comparison of trig-traverse and the older subtense method. The course length to be determined is indicated by the line AB. (Relative lengths are not shown, for these depend on the subtended angle in the case of the subtense bar and on the length of base and the subtended angle for trig-traverse.) For measurements of third order accuracy with the subtense bar, the course length AB cannot be greater than 500 ft. With the trig-traverse method, using a 500-ft. base, the course length can be increased up to 28,644 ft., still fulfilling third-order requirements.

Since the trig-traverse bases (BD_1 and BD_2) cannot be measured as accurately as the subtense base, two bases are used. Field experience indicates the value of the two-base system offsets to a great extent the slight inaccuracy of the base measurement.

Where length determinations are to be one part in 10,000, the ratio of the course length to base length is 20 to 1, so an error of .01 ft. in the determination of the base would result in an error of .20 ft. in the course. Base distances should be accurate, therefore, to less than .01 ft., preferably to .005 ft. or closer.

Through the two-base system, the effect of an error in base determination is reduced to about 0.7 of the effect of a single-base error. Futhermore, trig-traverse provides a check for any gross errors in the base measurement, since each base is measured separately and the distance D_1 to D_2 is measured for a check.

For the base measurements, use is made of steel tapes that have been compared with the national standard of lengths. A constant tension is applied to the tape to simplify corrections for tension and sag. For measurement of the distance subtense angles, a precise optical theodolite, reading to one second or less, is required. With this instrument, the base-length ratios can be used as a guide for closure errors.

Reasonable control over the accuracy of the distance measurements is exercised by limiting this ratio to 1:20. When the base ratio is 1:20, the angle subtended by the base is 2 deg., 51 min., 45 sec., or 10,305 sec. Hence, an error of one second would result in an error of one part in 10,305 in length determination. (For small angles, cotangent varies as a straight line.)

Multiple readings substantially increase the degree of accuracy, but both field costs and computing costs mount with the increase in pointings. Under good lighting conditions and with a proper base-course

[1]Chief Field Engineer, Aero Service Corp., Philadelphia, Pa.

TABLE II—Trig-Traverse Closures

USC&GS triangulation stations	Length of traverse	Closure
Marpen to Marpen	64,037 ft.	1:27130
Marpen to Penmar	87,791 ft.	1:42005
Penmar to Beacon No. 10	44,037 ft.	1:15291

TABLE III—Vertical-Control Closures

Bench Mark	Length—mi	Total closing error	Error per mile
Marpen-Marpen	12.1	0.035	0.0029
Sta-38EOM	2.0	0.031	0.0155
38EOM-TBM1252.7	18.0	0.103	0.0057

ratio, only one set of pointings direct and one inverted are required.

Traverse angulation under the trig-traverse method is determined with the theodolite, which yields negligible errors in azimuth determination.

In field tests of trig-traverse it was found that the base target must be designed for accurate reading and easy identification for both short and long courses. Differentiation of the station and base targets also must be readily apparent. The main station rod has two targets, and the base rods have single targets. All rods are 4 in. wide with ½-in. red center-stripe. Centered within the red stripe is a 1/16-in. white stripe. This stripe may be used for pointings where the course is short, but its principal purpose is to establish the center of the rod for measurement of the base.

Office computations under the trig-traverse method are somewhat burdensome, compared to transit and tape traverse computations. However, trig-traverse reduces the number of stations required so that the aggregate number of computations is less than that required by the older method. For example, recently 40 stations averaging 1 mile apart were required to complete the traverse between two U. S. Coast and Geodetic Survey triangulation stations. It is estimated that 60 miles of transit and tape traverse would be required to cover this, with an average of five stations per mile or a total of 300 stations.

To compute the trig-traverse course, the first step is the reduction of the measured base length to its true horizontal length. Corrections are made for tension, temperature, slope, and slope modification for the tension. Then the length of the course is computed. The base-length component that is perpendicular to the course is computed from the known angle between the base and the course and from the measured length of the base. This component of the base multiplied by the cotangent of the subtended angle determines the greater part of the length of the course. To this is added or subtracted the component of the base which falls within the course or the course extended.

TABLE I—Trig-Traverse Distance Checks

Course	Distance from Base $B\text{-}D_1$	Distance from Base $B\text{-}D_2$	Mean	Ratio of difference of mean and one length determination, to total length
37-38	4093.58	4093.63	4093.61	1:204,682
38-39	6162.42	6162.29	6162.35	1:101,038
39-40	990.93	990.96	990.95	1: 99,095
40-41	2316.93	2317.17	2317.05	1: 19,309
41-42	4312.11	4312.61	4312.36	1: 17,250

Two independent lengths are computed for each course, one from each base. The final length of the course is the mean of the two computed lengths. A comparison of the two lengths obtained is a check of the reliability of the length determination.

Some examples of the distances obtained on a survey in Maryland are given in Table I.

Although these length determinations do not represent a comparison to an absolute length, they do indicate a high order of consistency on the part of the observer. These length determinations have been extracted from a 17-mi. traverse which closed one part in 42,005.

Only third-order accuracy—one part in 5,000—is claimed for the trig-traverse method. However, most closures are of a higher order. In Aero Service's experience, mere third-order closures have indicated an error in the work. The bulk of our closures fall around one part in 20,000, with a substantial percentage of closures of a higher order. The traverse is helped by the accurate azimuth determinations with the theodolite, accounting to some extent for the excellent results. Representative closures from a recent trig-traverse in Maryland are given in Table II.

Since the trig-traverse station must be occupied for horizontal control, the vertical angle to the next station can be determined at the same time and bench levels of third order accuracy established between stations. With optical theodolites, determination of vertical angles can be held within 2 sec., 1 sec. of error attributable to the pointing, and another attributable to error in centering the collimation level.

Multiple readings are made with two vertical targets, giving a check on the accuracy of each determination of difference in elevation. Observation of two targets also permits use of different parts of the micrometer, compensating to some extent for any irregularity in micrometer divisions.

Reciprocal observations from each station are necessary to minimize refraction errors. Vertical refractions vary with atmospheric conditions and time of day, so these reciprocal observations are made within the shortest time possible on the same day, and observations are not made during the sunrise or sunset hours.

In the field we make two independent angular measurements direct with the precision theodolite, two inverted for each of the two targets, eight pointings in one direction.

In computing the elevation difference, an arbitrary refraction constant is applied to the vertical angle. Though this can be omitted, it checks the reciprocal observations.

Consistent, accurate closing errors are the final criterion of vertical closures. With the best observers, these average .01 ft. per mile. The elevation closures in a recent Maryland survey are given in Table III.

America's Road to Victory

. . . Let's Increase Production

This is the time to speak out—now—at the beginning.

Our industrial program for re-armament is getting off on the wrong foot.

The talking and writing about it emphasize the wrong things.

Its headline words are "cuts" and "controls."

Those words make bad propaganda for the cold war.

"Cuts" and "controls" are no words to challenge the imagination and energy of our own people. They won't impress the masters of the Kremlin. And they can only make it appear to the rest of the world that America thinks it can defend the free way of life by abandoning it.

America stands as the world's champion against aggression because America has become the most powerful free nation in the world.

How did we get that way?

Not by putting ceilings on wages; not by rationing or clamping iron-clad government controls all over business and industry.

To be sure, some temporary controls are necessary to channel very scarce materials speedily to use for defense. So, too, are special taxes and credit restrictions needed to combat inflation. But they will be fatal if they blind us to this fact:

We became the strongest nation in the world by out-producing every other nation.

Production—The Final Answer

Next year our government is planning at least a $40 billion military program. Instead of planning only on controls to divert $40 billion of production from the making of civilian goods to the making of military supplies, we should be figuring out also ways to push up total production.

Of course, our industrial plant is running at close to "capacity" now. And our labor force has reached almost full employment. There isn't much slack to be taken up.

Can even the United States add a $40 billion miracle of production on top of what it is already doing?

Our answer is "Yes"—and within two years. It can be done by adding about $6 billion each year to our program of capital investment which now runs about $22 billion a year.

Part of this added production will come from expanding our industries. The steel companies, for example, already have plans to increase their capacity almost ten per cent in the next two years.

But by far the largest part of that $40 billion of added production must come from higher productivity—raising industry's efficiency.

continued on next page

To meet our goals we need to raise our productivity five per cent a year.

Can it be done?

The answer is an emphatic "Yes."

Raise Industry's Productivity

McGraw-Hill's studies of industry's equipment show that there are countless opportunities for improving efficiency. Our manufacturing industries alone need at least $35 billion of new equipment to raise their facilities to first class technical standards.

Here are some of the broad possibilities reported by the trained editors of McGraw-Hill's business magazines:

In many manufacturing plants as much as 40 per cent of workers' time goes into moving materials and parts—shifting things about within the plant between processes and to and from shipping platforms.

FACTORY estimates that improved materials handling equipment and methods might well cut handling costs twenty-five per cent and save annually over 650,000 man-years of unnecessary labor.

Modern machine tools designed since World War II are 40 per cent more productive, on the average, than is old equipment. But AMERICAN MACHINIST surveys show that 95 per cent of industry's machine tools are of designs at least ten years old. Replacing them could raise productivity of the metalworking industries at least ten per cent—enough to absorb a major share of the metalworking industries' part of the defense program as now planned.

In coal mining, latest equipment and methods can raise productivity sharply. The editors of COAL AGE estimate that production of bituminous coal could be raised from seven tons per man-shift to ten within three to five years.

Many new textile production techniques are 50 per cent to 75 per cent more efficient than those in use now. If plants could be fully modernized, and full use made of latest management methods, TEXTILE WORLD estimates that output-per-manhour would rise 20 per cent. *A FOOD INDUSTRIES study indicates that modern equipment plus the best management techniques could raise productivity in food processing at least 20 per cent.*

These are just some of the opportunities that industry can seize and by which the nation can profit.

A Nation-Wide Effort

Of course, industry itself can't do the whole job. Labor, government and all the rest of us must cooperate.

Government's part is to see that its emergency controls are so applied that they will increase productivity and thus make possible an early lifting of such controls.

Labor's part is to help in the development of labor-saving methods and machinery and to welcome their adoption as the only sure way of continuing to advance the American standard of living while maintaining the American free way of life.

For all of us the job is to work constantly for an expanding, ever-stronger America with constantly growing productivity; not a pinched and shackled America cooped up under wage and price ceilings and tied to a ration card.

Challenge to Industry

Here is a sharp challenge to industry to study the best work-methods that are being reported—to use every minute and every dollar it can to replace obsolete equipment.

Here is a sharp challenge to government to do everything within its power to make its control policies and its fiscal policies strengthen the incentives to industrial modernization—to demand sacrifice for a purpose and not for effect.

The job to which such opportunities point will take time—though nothing holds back adoption of some of the simpler improvements in work-methods reported in business magazines all the time.

But increasing production is our one best hope that we may be spared the full array of price, wage and production controls now and be freed eventually from all controls.

General Omar Bradley has said that the protection of our national independence calls for "long-range commitments that we are willing to carry out."

A long-range commitment to fight this battle for peace with America's most powerful weapon—industrial productivity—is the surest guarantee of victory for the free world.

Let's make that commitment—now—at the beginning.

McGraw-Hill Publishing Co., Inc.

MARKETS—Trends and Prices (*Continued from page 69*)

U. S. Lead Consumption Sharply Higher

Tension over the Korean situation was responsible for the sharp rise in demand for all strategic materials that began early in the third quarter. Primary and secondary lead consumption in July and August, according to the Bureau of Mines, in tons, was as follows:

Metal products:	(a) July	August
Ammunition	2,673	3,530
Bearing metals	2,795	3,687
Brass and bronze	1,272	1,866
Cable covering	6,930	13,343
Calking lead	4,771	5,981
Casting metals	1,149	1,905
Collapsible tubes	801	1,175
Foil	238	311
Pipes, traps and bends	3,819	4,321
Sheet lead	3,486	3,448
Solder	8,080	10,382
Storage batteries (antimonial)	17,207	22,785
Storage batteries (oxides)	14,572	17,362
Terne metal	668	342
Type metal	1,665	3,986
Total	70,126	94,424

Pigments:	(a) July	August
White lead	3,272	6,672
Red lead and litharge	5,765	8,560
Pigment colors	1,013	1,321
Other	1,312	1,716
Total	11,362	18,269
Chemicals:		
Tetraethyl lead	9,274	10,105
Miscellaneous	549	735
Total	9,823	10,840
Miscellaneous uses:		
Annealing	364	438
Galvanizing	58	116
Lead plating	67	98
Weights and ballast	616	675
Total	1,105	1,327
Other uses, unclassified	884	1,175
Total consumed	93,300	126,035

(a) Revised.

Official London Prices

The British Ministry of Supply continues to fix delivered prices of copper, lead and zinc for the United Kingdom. Quotations in effect as November ended were as follows:

	Per Long Ton £	s.	d.
COPPER			
Electrolytic, high conductivity	202	0	0
Fire refined, high conductivity	202	0	0
Fire refined, high grade	201	10	0
Fire refined, min. 99.7 percent	201	0	0
Fire refined, min. 99.2 percent	200	10	0
LEAD:			
Soft, foreign duty paid	136	0	0
Soft, Empire	136	0	0
English, refined	137	10	0
ZINC:			
Foreign (G.o.b.) duty paid	151	0	0
Domestic (G.o.b.) duty paid	151	0	0
Prime Western and debased	151	0	0
Refined and electrolytic	155	0	0
Minimum 99.99 percent	157	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

November 30, 1950

Aluminum, ingot, 99 plus percent, lb. (base price)	19c.
Antimony, spot, lb., 5 tons and up but less than carload in cases	35.28c.
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$2.53
Calcium, 1 lb., ton lots, 98 percent, cast	$2.95
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$1.80
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	48c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	24½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$115.00
Selenium, 99.5 percent, lb.	$3.00
Silicon, minimum 97 percent, spot, carloads, lb.	16.50c
Tellurium, lb.	$1.50@$2.00
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty

METALLIC ORES

Beryllium Ore, imported, 10 to 12% BeO per unit	$26.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry 45% Cr_2O_3, no ratio	$20.00
48% Cr_2O_3, 3 to 1 ratio	$35.00@$43.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$8.10
Mesabi bessemer	$7.85
Mesabi, non-bessemer	$7.70
Lead (Galena), 80 percent, Joplin, Mo., ton	$218.42
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, 8¢ @ 22c., c.i.f. U. S. ports, duty extra. Long-term contract quotations wholly nominal.	
Molybdenum Ores, 90%, per lb. of MoS_2 f.o.b. mines	51c.
Tantalite, 60% concentrate, per lb.	$2.00@$2.75
Tungsten Ore, per unit of WO_3:	
Foreign, 60 percent, duty paid	$40.00@$41.00
Domestic, scheelite, 60 percent f.o.b. mine	$40.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$115.00

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	6c.
Cobalt Oxide, 72%, metallurgical grade, per lb. of Co	$1.95
Copper Sulphate, 100 lb.	$8.95

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of alloy, 5 lb. ingot	$1.56
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	21⅝c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$185.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo. contained	$1.22
Ferrosilicon, 50 percent, per lb. of contained Si	12c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.40
Ferrovanadium, per lb. of V delivered	$3.00@$3.25
Silicomanganese, 1½ percent 7, per lb. contracts	9.60c.
Spiegeleisen, per long ton, 19@21%	$70.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960@$1,050
Crude No. 2	$492@$550
Spinning fibers	$232@$475
Shingle fibers	$95.50@$141
Paper stock	$78.50@$88
Waste	$58
Shorts	$27@$52
Asbestos, Vermont, f.o.b. Hyde Park:	
Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00@$13.50
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.25@$9.50
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	$4.50@$5.50
Domestic, chemical, 55 to 58 percent	(a)$8.50@$9.50
Domestic, abrasive, 80 to 84 percent	$18.00@$18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50@$9.50
North Carolina ceramic grade	$20.25@$22.25
Feldspar, bulk ton:	
Potash or soda Feldspar, 200 mesh, ceramic grade	$18.50@$22.25
Glass par, white, 20 mesh	$11.75@$12.50
Fluospar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, CaF_2, ton	$41.00
Acid 97% concentrate, bulk, ton	$46.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$56.30
Mica—Domestic, f.o.b. mines, Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.50; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $120@$130 per ton. Bulk sales, dry ground, $32.50@$60.00 per ton. Scrap, $30 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton	$22.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$30.00

(a) Nominal. (b) Quotation in previous issue revised to $46.50.

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$49.00
Steel, f.o.b., Pittsburgh billets, net ton	$53.00
Structural shapes, 100 lb.	$3.40

KEEPING TAB ON PRACTICE

A New Angle in Drilling Research. By way of exploring the possibility of cutting drilling costs still further, a mid-western operator recently started experiments using 1¼-in. seamless electric steel tubing in place of drill steel. This tubing was shanked and threaded. Results with the first trial batch of about 5,000 lb. were very satisfactory. The footage drilled before breaking was about 400 ft. compared with approximately 112 ft. obtained with conventional drill steel. Some 1¼-in. tubing was then tried but with very unsatisfactory results, the reason for this failure being as yet unknown. The company is now starting a new series of tests with the 1¼-in. tubing, thinking it may shed some light on the failure of the smaller tubing.

Bulldozers Electrically Driven. Evidently to test the practicability of driving bulldozers electrically, a prominent iron mining company in the southeastern United States has built two of them, driven by electric power, and put them to work at repairing and maintaining haulageways for underground trackless hauling equipment. The machines are "home-made" and are mounted on International tractor crawlers. They appear to be serving a practical purpose, inasmuch as the operator has ordered two electric-driven bulldozer power units of a well-known make. The latter are expected to be in operation in about three months. They are understood to be combination loaders and bulldozers.

How Much Carbide? Last month we asked how much tungsten carbide is consumed annually in making carbide inserts for drill bits and tips in the non-coal mining industry (E&MJ, Nov., 1950, p. 107). An estimate obtained from a reliable source is "a little less than 20 tons." So it would seem that there must be quite a bit of scrap carbide around, taking into account that the coal industry is also a consumer and that scrap has been accumulating for years.

The Bottom-Dump Skip Again. F. J. Haller, superintendent for Cleveland-Cliffs Iron Co. at Ishpeming, Mich., says they have a bottom-dump skip of new design made for them by Lake Shore Engineering Co. at Marquette. This skip has a capacity of about 225 cu. ft., or about 13.5 to 14 long tons in this particular district. It has been in service, in the Mather "B" shaft, since Aug. 10, and has given such satisfaction that two more have been ordered for the Mather "A" shaft. We hope to be able to give design details in any early issue.

Pillar Mining at Teck-Hughes. Teck-Hughes Gold Mines, Ltd., Kirkland Lake, Ont., has gotten to the stage where they are mining their pillars. The bursting nature of the ground is such that ordinary methods have proved impractical and unsatisfactory. They were about to abandon the ore in some of the pillars when they decided to try long-hole percussion drilling. Under this system they can put in blast holes from a safe location to slice off a substantial portion of the pillar with a minimum of disturbance to the ground. After blasting, they stay out of the area long enough for the rock stresses to adjust themselves, thus minimizing danger from rock bursts. When miners finally go back in, there is enough muck to keep them busy while another such pillar is being handled in the same manner.

These blast holes are usually 20 to 50 ft. long. Originally they were diamond-drilled. Various kinds of couplings, carbide bits and chuck ends have been tried. Rods used are 1 in. quarter-octagon Atlas Chippewa drill steel upset at the ends to the proper diameter for threading. Currently 1¼-in. round lugged ring seal shanks are favored in combination with 3½-in. drifters using 4-ft. automatic feeds, 2-in. carbide bits, and Ingersoll-Rand type-2 couplings. Although breakage and wear at the threaded joints (mostly in the rods) is troublesome the management feels that this is not serious, since comparative cost figures show $2.50 per foot for diamond drilling and about $0.75 per foot for the percussion drilling. In conjunction with this they are using milli-second delays for blasting which have helped immensely.

More Diesel Mine Locomotives. Howe Sound's subsidiary Calera Mining Co., Forney, Idaho, is using an 8-ton diesel mine locomotive for main level haulage in its Blackbird cobalt mine (described in *E.&M.J.*, Oct., 1950, p. 89). This is of Plymouth make, with a Hercules motor, according to the management. Exhaust gases are conditioned by being passed through water in a tank of Ruth design. Six 11-ton cars are handled per trip over a maximum distance of 6,000 ft. Grade averages 0.70%. The main level is exhausted at 30,000 cfm. Underground crews are said to like this installation.

Idarado Mining Co., Ouray, Colo., also has installed a diesel locomotive of Plymouth make underground.

These units are built by Plymouth Locomotive Works, Plymouth, Ohio. The Plymouth management says it has supplied diesel locomotives for tunnels and non-gaseous mines, but has not yet built one suitable for all-around underground service, although it is contemplating the possibility of doing so. Several of its locomotives have been equipped with water mufflers and used in tunnels and non-gaseous mines. The management further states that several other Plymouth locomotives, in service in metal mines, have been provided with Ruth exhaust conditioners by the users (as in the case of the Blackbird mine cited).

International Diesel Electric Co., Long Island City, New York, is also turning out a diesel-driven mine locomotive. It has requested the approval of the U. S. Bureau of Mines for this unit. Another domestic manufacturer, as yet unnamed, is likewise seeking approval. In all, three builders have sought the Bureau's approval so far. The third is the Hunslet Engine Co., Leeds, England.

Re Bureau Approval of Diesel Equipment. At present, approval by the U. S. Bureau of Mines is not necessary before diesel mine locomotives can be sold or used in underground non-coal mines in the United States. Of the locomotives and other diesel-driven units now in use in such mines, none have this approval. Three companies, as stated in the foregoing paragraph, have applied for approval. In each case, the locomotive for which approval is sought must be submitted to the Bureau for testing.

What effect the approval of some units by the Federal Bureau, once this is accomplished, will have on the sale or use of unapproved equipment is a matter of speculation. Conceivably it might lead to prohibiting the use of non-approved equipment in metal mines. As to this, opinion meriting attention holds that all power equipment used in mines should have some tag of approval from the state agency charged with responsibility for preventing accidents. In metal mines, in fact in buildings or in almost any conceivable operation including coal mines where an explosion hazard is present, the controlling factor is that of providing adequate ventilation. The next consideration is fire prevention.

So many things are tied up with the diesel locomotive, such as kind of fuel and storage of fuel, that have no bearing on the locomotive itself, the foregoing authority continues, that it

makes the approval of the locomotive something entirely different from that of explosives, for example. The Federal Bureau tests and approves explosives classed as permissible for coal mines where an explosion hazard is to be guarded against. In so doing, it is necessary to provide an explosive that makes more poisonous gas per unit than the gelatin dynamites. It would be hazardous to require permissible explosives in ordinary metal mines for reasons that are obvious. The same holds regarding diesel equipment, and, to this extent, in the opinion of the authority quoted, ventilation is more important to safety than approval. However, the approval of particular equipment should help to sell it, but such approval is not going to guarantee safety if the ventilation is not as it should be.

The same authority holds that the best way to get around the matter of providing ventilation and fireproof quarters, as well as of handling fuel, is to treat the two items separately and not make the approval of the machine dependent upon them.

Multi-Use Bit Requirements Up. News from Timkin has it that the company's Mount Vernon (Ohio) rock bit division is increasing its force by about 75 men. Increased requirements for threaded multi-use steel bits (taking two-thirds of the additional workers) are given as one reason. Removal of the company's carbide-insert bit department to Mount Vernon from the Canton roller-bearing factory will take the remaining 25 men.

Carbide Tips at Mountain Copper. Test work with carbide-tipped drill steel by Mountain Copper Co., Matheson, Calif., has been satisfactory and is continuing, according to C. W. McClung, superintendent (see also E&MJ, Jan., 1950, p. 82). Twenty pieces (16 with chisel-type forged bits and 4 with forged cross bits) were made up some time ago from ordinary carbon steel in the blacksmith shop for use in drifts and stopes. Use of Park A and other alloy drill steel is contemplated, even though the results with the carbon steel rods have been excellent.

This first lot of 20 pieces, comprising five sets of four pieces each, is made up of 1-in. quarter-octagon stoper steel, the pieces being shankless. Starters are 30 in. long, followed in order by pieces 48 in. and 66 in. long and the finishing length of 7 ft.

The chisel bit is of ordinary design like that of the Coromant bit except that the insert has a flat surface in cross section, when new, instead of the slightly convex surface of the insert of the Swedish bit. As bits are reground, they gradually assume a curved face. There is also a water hole on both sides instead of on one side only. The inserts are fairly heavy, being ⅜ in. wide by ⅝ in. high. The length varies, but it is expected that the maximum bit diameter will probably be 1½ in. Gauge difference between bits within a set is thirty thousandths of an inch.

The bit head is forged on the end of the rod in a conventional sharpener, trued in a lathe, slotted in a small milling machine, after which the carbide inserts are soldered in with silver solder, using an acetylene torch.

As to performance, the 1½-in. bits of the set have drilled more than 1,100 ft. and appear to be good for a much greater footage. They are used with medium-heavy drifters and stopers. Powder saving amounts to about 50 lb. per 28-hole drift round 7 ft. deep. A similar saving is made in stopes. A careful record is being kept of each rod, but the life expectancy is such that it will be several months before a factual comparison can be made.

Machines employed so far have been the I-R R48 stoper, the D.A.30 Leyner, and a mounted J.B.5 jackhammer. The 1½-in. bit and the R48 stoper appear to make a satisfactory combination. Tests with machines of other weights are planned.

A group of 12 pieces of ⅞-in. hexagon jackhammer rods with forged four-wing cross bits has also been prepared. This stoper steel has been continuously in operation since Sept. 10 and is still performing satisfactorily.

So far the chisel bit has proved superior to the cross type. Tests of the three-wing type on starters are also planned.

The solid steel has proved popular with the men and is preferred to detachable bits. No advantage is discernible in the use of the latter for work at this mine, according to Mr. McClung.

Swedish Jumpers in Utah. Some Swedish drilling equipment, such as that which has attracted attention in Ontario and Quebec mining areas, found its way recently to Utah, when the Chief Consolidated Mining Co., at Eureka, bought two Atlas RH 655 drills, with "pusher and raising" legs and carbide-tipped steel. John G. Hall, superintendent, says performance of drills and legs has been excellent, though breakage has been excessive, a difficulty that they expect to overcome. They have been using a ⅞-in. steel of hexagon section and have a 4¼-in. collared shank. Breakage, when it occurs, is usually about 3 to 5 in. toward the bit from the collar on the shank, and appears to be due to the heat treatment given the steel. Lengths used, exclusive of the shank are: 2 ft. 7 in. (bit gage 1.575 in.), 5 ft. 3 in. (bit gage, 1.535 in.), and 7 ft. 10 in. (bit gage, 1.496 in.).

This equipment has proved popular, and in cases is also replacing Leyner-type machines and air bars in drift work. The chisel-type bits have been found to be easier to pull from ravelly ground than conventional 4-wing bits; though a 7-ft. hole drilled in such ground with a chisel bit may prove harder to load. Transportation and resharpening offer problems that must be overcome before the management could standardize on this equipment.

Twin Loaders for Mechanical Sinking. At U. S. Smelting's Ophir property in Utah, the work of sinking a 26-deg. incline has been mechanized by using two Eimco loaders, side by side on parallel 30-in. gage tracks 24 in. apart, for mucking and a specially designed jumbo, which runs on the two inside rails, for drilling. The skips operate on the same tracks as the loaders. When mucking is completed, the loaders are hauled to surface, each having a drum on its rear axle for the purpose, and are hoisted out of the way by a boom. The jumbo is then lowered on the center rails to start drilling the next round. Sinking speed is about 5 ft. per day in shale.

Here's About Forged Alloyed Steel. An effort to discover which Ontario mining companies are still making use of forged *alloyed* drill steel, that is, with bits forged on the end (without carbide tips), as described by Charles Kemsley for Dome Mines, Ltd., in E&MJ, August, 1943, has yielded results. C. Gibson, of the Mines Accident Prevention Association of Ontario, has kindly supplied the following data:

"In the Kirkland Lake and Larder Lake districts five gold mines are using this means of drilling, but only for drilling a large (2½-in. diameter) hole in the cut for development faces. Their names are Kerr-Addison, Sylvanite, Teck-Hughes, Toburn and Wright-Hargreaves.

"In Porcupine three gold mines use alloy steel with bits forged on them. In two cases, Buffalo-Ankerite and Paymaster, these drills are used as starters only. At Dome Mines about 50% of the steel in service is of this kind (as stated seven years ago in Mr. Kemsley's paper.—Editor).

"There are no mines in the Sudbury district using alloy steel with the functional type of cross-bit forged onto it for drilling. All have standardized on the Craig detachable bit.

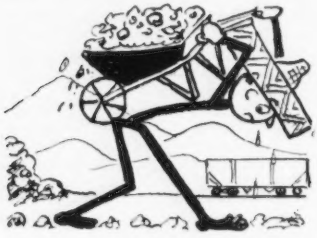
"In Red Lake, none of the 7 producing gold mines use alloy steel with forged bits for drilling."

New Wrinkles in Roof Bolting. Coal companies are experimenting with three unusual roof-bolting techniques: (1) Wooden pins 2 in. in diameter with slots at both ends. A wedge at one end is driven against the bottom of the hole, and a wedge at the other clinches the roof surface. (2) Grouting holes with cement to replace pins. This cements crevices together, and prevents initial rock alteration and slough. (3) Grouting steel pins in place to increase bond between steel and rock.

Success or Mediocrity?
A Few Minutes a Month Can Decide

Have you heard about the young mining engineer . . . who set out to raise efficiency at a certain mine in Mexico? Well, the lad was on the job a few days when he discovered that laborers were loading concentrates into a railroad car, one shovelful at a time, from a stockpile 100 ft. away. You may be sure that it was no more than 24 hours before each laborer had a wheelbarrow.

One week later the young engineer was back to check on the improved car-loading operation. To his utter dismay, the situation was worse than ever, for each laborer was filling his wheelbarrow, carefully lifting it onto his back and then staggering to the railroad car to dump it.



It has occurred to us that, like the Mexican laborers in our fable, some E&MJ readers are not making the best use of the bookful of mining information they get each month. In talking with these men in the field, we generally try to pass along pointers from other mining men who have told us how they use E&MJ to help them do a better job for their company and at the same time further their own careers. It sounds like this:

Time! T-I-M-E! That's what I said. Don't have enough time to read E&MJ.

Sure—time is a rare commodity these days, but how about asking yourself if you can afford *not* to put in the time?

Well, how much time do you think I should spend on E&MJ?

Just a few minutes more, once a month, than you spend on your newspaper every day. Perhaps the best thing is to take time once a month right here in your office.

Not in this office! I'll have you know that I put in a full day. Besides, wouldn't it look funny if people came in and found me reading a magazine on the job?

If it's inconvenient to read E&MJ on the job, take it home.

Not if it's part of your job—and it should be. But if it's inconvenient, take your copy home. Shift bosses, for example, can't be expected to read E&MJ at work.

Frankly, I hate to bring my job home.

In that case, let's change the subject. Who do you think will win the Rose Bowl game?

Well, actually I guess I could find a little time to catch up on my technical reading.

You sure could! But a lot depends on how you use that time.

Reading is reading. If I'm going to cover everything that's in the magazine each month, what difference does it make how I read it?

Let's face it! This isn't reading for reading's sake. E&MJ comes to you as a valuable tool. To get the most out of a good tool, you have to know how to use it.

Okay! So I read E&MJ cover to cover. Then what?

Hold it! Nobody said anything about reading it cover to cover. The secret is to go through the book systematically and read only what applies to your job or interests.

Oh, you admit I don't have to read every precious word?

E&MJ covers many fields in the industry—mining, milling, geology, management, smelting, etc. It's unusual to find one man equally concerned with all the phases. We get something in for all of them.

And just how do I know if an article, even if it's in my field of interest, is something I want to spend my time on?

Editors sweat blood on that one, trying to fit in a title that tells the story at a glance. They also use illustrations and captions to tell you quickly what value you'll get from the article.

You said something about regimenting my reading habits a while back.

Not me! All I said was that it saves time to read systematically. You choose your own system.

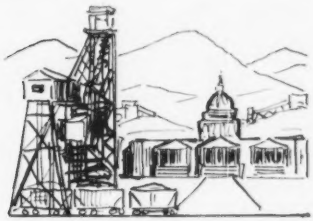
You're the expert. Suggest one.

Well, here's one that will give you the general idea. In your first thumbing through, read the sections that have some news value like E&MJ Outlook, where the editors keeps an ear to the ground for you. Then there are the Market pages and Washington Reflections to keep you up to date on prices and legislation, both of which may have an important bearing on the job you're doing. This Month in Mining and Personals helps you keep up with your friends in the industry and with what is going at other properties.

Next, go through the major articles. In no more than 10 minutes you can get the gist of each. For details on items pertaining to your own field, turn back and read the text. You can learn enough about the others from a perusal of the first page to keep you informed of developments in other fields of the mining industry.

Frankly, technical magazines aren't usually classed as torrid entertainment.

Then you get to the operating departments of the book where you should spend a fair amount of your reading time. Here you'll find departments like Operating Ideas—helpful kinks to make everyday jobs around mine, mill and smelter easier and safer; Keeping Tab on Practice—a running account of new developments in all phases of mining practice from operations all over the world; and New Products Digest, which keeps you posted on new equipment.



Brings Washington right into your own backyard.

That uses up my month's reading time and I'm a walking file of information. What now?

Before you stumble, put the information in an honest-to-goodness stationary file. They say that a man's judgment is no better than his information, but if your information is going to do you any good, it has to be readily accessible and in usable form.

We've got a storeroom full of old technical magazines downstairs. They ought to help.

Not stacked in a storeroom, they won't. To demonstrate, about 14 months ago E&MJ ran an article on a quick, inexpensive way to put in a sump. You weren't worried about sumps then and that issue, like every other, wound up in your downstairs stockpile. Right now you find yourself in need of sumps. It is not likely that anyone on the staff recalls the article that might save you construction time and money. And if they do remember the article, 5 will get you 10 they can't find it.

And 5 will get me 10 you have an answer to that one.

Sure have! Two answers, in fact. First you can just tear out the articles that apply to your job and put them in folders appropriately labeled under such headings as "Drilling and Blasting," "Hoisting," "Gold Mining," etc. Use as many subdivisions as you find convenient.

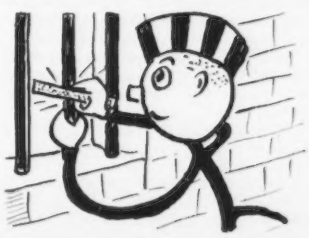
A man's judgment is no better than his information.

That's fine, but suppose the last page of one item I want to clip is on the back of the first page of another on an entirely different subject?

Well, you can solve that one by clipping from two issues or cross-indexing the dual page. But after you have torn out what you want, the magazine is in poor shape for anyone else to use. Then, too, you can't always tell at the moment just what information you will want in your files three years from now.

That's why you have a second system up your sleeve.

Check! The second system takes a little more time but you get better results. What you do is make out a 3 x 5 index card (larger if necessary) for each article, with subject, title and author plus a summary of the article or any other information you find useful. Labeled cards are filed by subject at your desk, and the intact issues of E&MJ are filed chronologically. Now when you hit your sump problem, your references are handy and you can get hold of your information in a few minutes. This filing system will take about 30 minutes of your time each month. There is a short cut, though. Once a year, E&MJ puts out an index for the entire 12 issues. This index, filed by subject and giving title and author, may take the place of your cards.



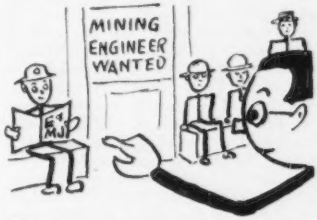
A good file helps!

Apparently I need nothing more than the ability to read to be a big success in mining.

Not unless you've got something on the boss. Sure, E&MJ is a good source of ideas, which are your stock in trade. Top mining talent from all over the world are contributing and in any issue you'll find some 30 men are adding to your store of knowledge. But no substitute has yet been found for doing your own headwork.

So the formula you recommend is one part cogitation and one part technical articles.

Don't stop there! Manufacturers put out a tremendous amount of informative free literature. They try to keep you posted on what they have that's new, and since their equipment is aimed at making your job easier, safer or more profitable, it pays to keep an eye on what they are saying.



"The job goes to these 30 men here."

You mean I should read through all those pages of advertising?

Do you dig only half the ore in your mine? Read the ads like you read the articles, sticking mostly to items in your own field. And the editors help you out here. Outstanding items among the manufacturers' literature are listed every month with a description of their contents. Choose what you need, and to get it all you do is circle its number on the stamped reply card provided and mail it.

That's quite a course you've mapped out.

It's worth the effort. You can't help but increase your useful knowledge and your value to your employers, and this, 9 times out of 10, will lead to promotion.

Go on—say it! All I have to do to be a manager is read E&MJ.

Well—I don't know of any manager who doesn't.

WASHINGTON REFLECTIONS

Seabrook Hull, McGraw-Hill Washington News Bureau

Metal Control Orders Are Issuing Rapidly

National Production Authority control orders started appearing in greater numbers during November. Early in the month, orders came out controlling and limiting the use of both aluminum and zinc, and, on cobalt Nov. 21 and copper Nov. 29.

Two new controls on the use of aluminum were announced. One, OPA Order M-5, sets maximum limits (similar to the earlier steel order) on the volume of "DO" orders the metal producers have to accept. The other NPA order, M-7, is a use cut-back regulation aimed first at supplying the stockpile with upward of 100,000 tons of aluminum ingot in the next six months.

NPA Order M-5 relieved aluminum producers and fabricators of the obligation to accept "DO" orders for more than 25% of their total output for any single month. It also directed producers of primary aluminum to accept rated orders from independent fabricators up to 6.5% of scheduled monthly production of pig and ingot.

Within these general limitations, the following specific ceilings were set on the "take" of "DO" orders: rolled shapes, rod, bar, wire and cable, 15%; castings and unspecified mill products, 20%; sheet, plate and strip, and secondary ingots, 25%; extrusions and tubing, 35%; forgings and pressings, 40%.

NPA Order M-7 simply cuts civilian use of aluminum by 35%, based on the average quarterly use during the first six months of this year. It ostensibly reserves this "saving" for use on "DO" orders. Actually, until the defense production program really gets rolling, most of it will go into the stockpile.

In an effort to increase basic aluminum production by 500,000 tons a year, the Government is offering five-year buying contracts and accelerated amortization as an incentive to the industry. Actually, this is just a tentative offer. In effect Washington is saying "Here, take this offer, and go out to private lending agencies and see how much money you can get." If the answer is that industry can't raise the capital, direct Government loans or something similar are bound to follow. Long-term aluminum expansion goal is 1,000,000 tons.

NPA's Order M-9 puts similar limits on the amount of zinc that has to go into priority production. In general, it follows the same line as the earlier aluminum and steel orders.

It states that no producer of zinc, zinc dust, or zinc oxide need accept "rated orders for shipment in any one month of a total tonnage of zinc, zinc dust, and zinc oxide in excess of 10% of his scheduled production of such items in terms of total tonnage for that month." No exemption will be given for material treated on toll.

The copper orders, M-11 and M-12, require that possessors of "DO" orders must get specific NPA authorizations for their needs for unalloyed copper. Producers must hold down inventories to minimum working levels not exceeding 45 days' supply. No "DO" order need be accepted without 45 days' lead time. Consumers are limited to 85% of their first 6 months of 1950 average during January and February and to 80% during March. Their inventories must not exceed 60 days' supply. Consumers of less than ½ ton quarterly are exempt.

The cobalt order restricts non-defense users to 50% of their average use during the first 6 months of 1950 and to a 20-day inventory.

NPA Is Tightening Inventory Controls

Tough inventory controls, essential to allocation of materials, are in the works. Proportions of the coming controls are clear—60 days' supply on all metals vital to mobilization.

Enforcement—of inventory ceilings as well as other controls—is the business of NPA general counsel Manly Fleischmann. He has already selected a man to head up his enforcement staff. His man, John Peckham, headed WPB's New York field office in World War II. He will start hiring people as soon as he gets the "Go Ahead" signal from NPA's top brass. No control is deemed likely to be effective without a police force.

New Foreign Aid Plans Will Affect Mining

The Gray report to the President on foreign economic policy contains several recommendations of interest to the mining industry. These are:

One half a billion dollars in grants and $800 million in development loans each year to underdeveloped countries;

More money for developing strategic materials abroad, including long-term purchase contracts;

Repeal of the "Buy American Act";

Extension (next year) of the Reciprocal Trade Agreements Act for another four years, adding emergency power for the Administration to suspend tariffs on scarce materials.

U. S. pressure on raw-material producing countries to agree to allocate part of their output to assure a steady flow of materials for the defense effort at reasonable prices, the U. S., in turn, to see to it that essential exports are kept available for the raw material areas;

Continued non-military aid to Western Europe for another three years, though on a diminishing scale;

An increase in Export-Import Bank's lending authority from $3.5 billion to $5 billion.

The report does not represent official Administration policy, but is bound to be reflected in that policy, when the latter is determined. A complete review of foreign aid policy is due in early 1951. Obviously, any practical aid to undeveloped countries will lean heavily on mineral development. Despite this fact, no mineral man is included in the 12-member Foreign Development Advising Committee headed by Nelson Rockefeller.

Excess Profits Tax May Be Delayed

It will be surprising if the present lame-duck Congress is able to push through any excess profits tax legislation, particularly the really tough bill the Administration has proposed. Extensive hearings must first be held in the House, and then followed by Senate hearings. Also, it usually requires considerable time to iron out differences between House and Senate on controversial measures.

That doesn't mean there won't be any excess profits tax. To the contrary, nearly everyone is convinced that politics will call for some kind of "defense profits" levy, despite the undesirable features of this type of tax. But the final form it will take is open to many long hours of debate.

The Treasury proposal would add $4 billion to corporation taxes in 1951. Moreover, if it's retroactive to July 1, 1950, as the President wants, it would add $2 billion to 1950 taxes.

Corporations could treat as "normal" (exempt) earnings the average of the best three years out of the four-year period, 1946-1949, less 25%.

Or they could use an invested capital base similar to that permitted in the last war's law, with the percentage rate in each bracket raised by 25 to 33 1/3%. In the old law, companies using the invested capital method got a credit against profits amounting to 8% on the first $5 million of capital, 6% on the next $5 million and 5% on capital above $10 million.

Borrowed capital would get more favorable treatment than it did during the last war. The Treasury plan would allow a corporation to include in its exemption the amount of interest paid on the borrowed capital, plus 25 to 35% extra. The World War II law permitted inclusion of 50% of borrowed funds in the invested capital base, and disallowed half the credit claimed for interest paid.

All corporations would get a minimum average base-year-earnings credit of $25,000 to help small business.

The tax rate would be 75% of taxable net income.

The Treasury suggested re-adoption of the "abnormal conditions" relief provision (Section 722) and more liberal treatment for undistributed profits included in the invested capital base.

In addition, Secretary Snyder recommended study of a formula to give special treatment to companies that were just getting started during the base period; but no details were offered.

Personnel Announced to Head DMA Divisions

The Interior Department's Defense Minerals Administration, headed by Dr. James Boyd, has announced the personnel which will head the organization's three operating divisions.

Harold A. Montag, assistant to the president, Joy Manufacturing Co., will direct the Requirements Division, which will deal with maintenance, repair and operating supplies, and equipment needs of the mining, smelting and refining industries.

The Production Expansion Division will be headed by C. O. Mittendorf, now with ECA's mission to Turkey and former head of the Premium Price Plan Committee in the latter stages of World War II. Mr. Mittendorf is a mining engineer. His division will provide financial assistance for exploration, development and expansion of production, utilizing the field personnel of the Bureau of Mines, Geological Survey and RFC for examinations.

The Supply Division will be in charge of Samuel H. Williston, president of the Sperry-Sun Well Surveying Co. and vice president of Cordero Mining Co. (quicksilver). The Supply Division will be a planning agency, forecasting requirements and programming production goals. In this capacity, it will cooperate with Commerce Department's National Production Authority, which has the primary production planning responsibility.

On Nov. 21, NSRB announced that the Government is ready to receive applications for loans. Forms can be obtained from field offices of the Interior and Commerce departments or from Interior, Commerce or NSRB in Washington.

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

WAGE CONTROLS: They are on their way. Something like the little steel formula already is being drawn up. Object is to have formula ready before Government has to make a decision in a specific dispute, as in steel or coal mining. However, the fifth round of wage increases will run its course, uncontrolled.

THE FORMULA: No wage freeze. Plan is to tie wages to cost of living, letting wages keep up with rising living costs since Korea.

BIG PROBLEM: What to do about automatic "annual improvement" increases in General Motors and other contracts.

ESCALATOR CLAUSES: Regulating wages by cost-of-living index is not popular in Mine, Mill and Smelter Workers or other left-wing unions. Philip Murray's CIO Steel Workers don't like it, either. If you consider a cost-of-living escalator, remember that BLS is revising its index this month. Revised figures will be higher, but BLS will publish both revised and unrevised figures for another year.

HOW THEY WORK: Characteristics of cost-of-living escalator wage clauses—how they work—and some sample clauses from union contracts can be found in a new BLS bulletin on "Cost of Living Wage Adjustments in Collective Bargaining." It is available without charge.

THIRD LABOR FEDERATION?: Bridges denies that recent Washington conclave was the beginning of a left-wing labor federation to rival the CIO and AFL. But a federation of these unions seems to be coming. They have banded locally in Chicago into the Committee for Labor Unity, with Mine-Mill's Raymond Dennis as secretary-treasurer. Dennis is a new Mine-Mill board member from Cleveland.

A. S. & R.: Had to close its Tacoma smelter Nov. 8 because of repeated wildcat stoppages by Mine-Mill Local 25. Company's voluntary 10-cent raise, not required by contract, was rejected by Local 25, although nine other A. S. & R. locals had accepted it. Local 25 wanted higher wages equal to those paid in lumbering in Tacoma area. Strike was settled in late November.

KENNECOTT: Travel-time pay has been agreed to by Kennecott Copper Corporation for employees at Bingham Canyon. The four unions which participated in negotiations leading to the agreement planned to force Kennecott into joint bargaining on wage rates, too.

MANPOWER: Reliance on voluntary, rather than compulsory, measures for filling defense manpower needs is reiterated by the new Assistant Secretary of Defense in charge of manpower and personnel, Mrs. Anna Rosenberg. She is also strong for universal military service. You will hear more about that after the new Congress convenes.

TRAINING: Employers should concentrate on training employees and utilizing their highest skills; we must make up for lack of quantity with better quality. That is the view of Robert C. Goodwin, new director of defense manpower.

RECRUITING: Exhaust labor supply in your local area before recruiting in other areas, Goodwin advises. Additional workers will have to come from older groups, women, minority groups and the handicapped. The military is grabbing young men reaching work age and the pool of unemployed is almost gone.

JOBS: October employment of 61.8 million and unemployment of 1.9 million set new high and low marks for October. Labor market will continue to tighten through the winter.

TAFT'S VICTORY: Was especially significant because Taft appealed directly to union members in defending Taft-Hartley. He got many of their votes, winning in all eight of Ohio's industrial areas. Employers would be foolish, however, to interpret this to mean that union leaders will have less support from their members in bargaining with management.

LABOR IN POLITICS: Last month's poor showing at the polls will not deter labor unions' political activities. On the contrary, they plan to get deeper into politics and to broaden their political base by trying to attract the support of other groups—white-collar workers, non-union workers, farmers, small business men.

WORKWEEK: Longer working hours provides one measure of labor scarcity. Many employers are lengthening the workweek to ease the shortage of workers, particularly skilled personnel. In October the workweek hit the highest average since the end of 1945—41.4 hours.

OPERATING IDEAS

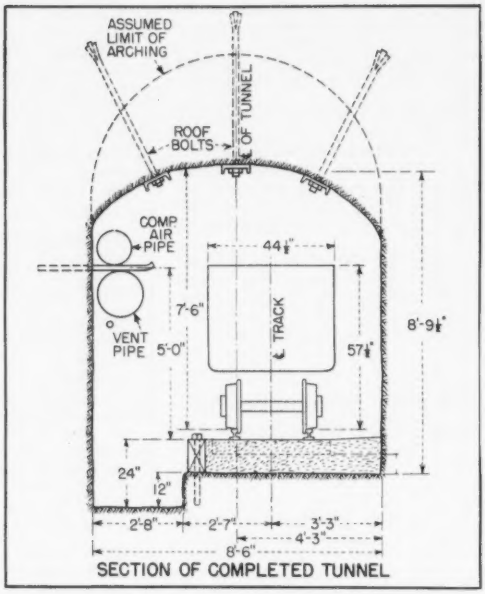
Roof Bolting Eliminates Timber at Telluride

Absence of extensive timbering in the new Mill Level tunnel of Telluride Mines, Inc., Telluride, Colo., is due to the use of roof bolts in occasional sections of the tunnel requiring support. The country rock penetrated by the tunnel consists chiefly of a red medium-bedded sandstone which normally would require timber support in places. Three advantages have been realized as a result of the adoption of roof bolting: (1) The system is cheaper than timbering; (2) the haulageway is free of obstructions, and (3) resistance to air flow for ventilation is substantially diminished due to the absence of timber.

The roof bolts in use consist of 1¼-in. rod, 5 to 10 ft. long, depending upon conditions in the back. One end is threaded to accommodate a nut and washer. A slot about 6 in. long and ⅛ in. wide is burned into the opposite end with a torch. The wedge, which tapers from 1 in. at the heel to a point, is 6 in. long and burned from steel plate about 1 in. thick.

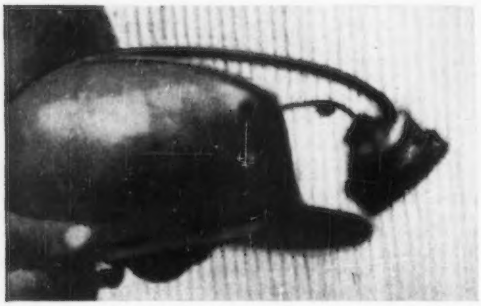
The rods, with steel wedge partially inserted, are driven into the back holes of the tunnel with a stoper. A special adaptor fits into the chuck of the stoper and is threaded to screw onto the threaded end of the roof bolt. As the wedge is driven against the bottom of the hole, the wedge spreads the slotted end of the bolt, thereby creating a tight connection between rock and steel rod.

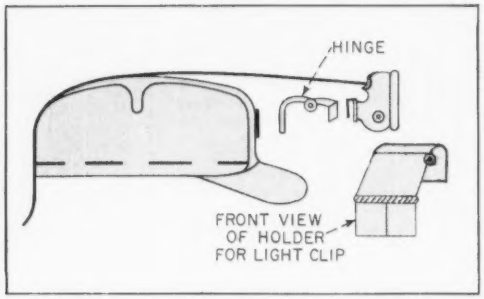
Generally the bolts are installed radially across the back of the tunnel on the theory that the rock will arch and the rods will exert maximum holding power if driven approximately normal to the surface of such an arch. In some instances several roof bolts are attached to channels, which in turn are used to support back lagging. When single bolts are used, a short length of channel is inserted beneath the nut and washer to increase the bearing surface of the assembly.



SECTION OF COMPLETED TUNNEL

E&MJ expresses its thanks to A. C. Hilander, chief engineer of Telluride Mines, for submitting this article, and C. F. Parker, Jr., general manager, for releasing the information.

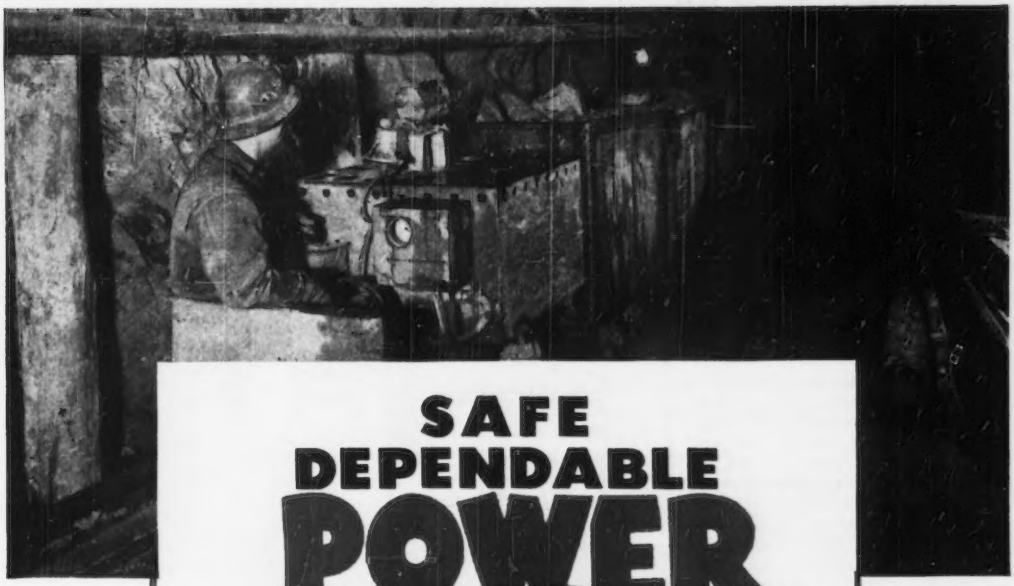




CAP-LAMP HOLDER is readily adjustable to focus light on work and can be attached to or removed from a hat in 2 or 3 sec.

Detachable Cap-Lamp Holder Focuses Light on Work

The adjustable cap-lamp holder illustrated here was made by W. D. Thomas, electrician, Beelick mine, Standard Fire Creek Coal Co., Beelick Knob, W. Va., to permit a worker to focus his light directly on the work without moving his head or hat. Especially helpful to shop mechanics and electricians, the holder can be attached to or removed from the hat in 2 or 3 sec. It is easily made from strap hinges or any other scrap available. This item is published through the courtesy of Coal Age.



SAFE DEPENDABLE POWER

Get UNIFORM SPEEDS throughout shift with EXIDE-IRONCLAD POWER

Put *full shift availability* into your battery-powered locomotives, trammers and shuttle cars. With Exide-Ironclad power, they'll handle as much load during the last hour as during the first. Also, Exide-Ironclad Batteries assure you:

- safe haulage.
- instant starting and fast acceleration.
- no unscheduled down time, hence more production per man per shift.
- flexible, self-contained haulage units mean quick car changes, less idle loader time, higher main-line tonnage.
- low operating and maintenance costs.
- exceptionally long life—proved in more than 100,000 heavy-duty jobs.

Combined, these superior characteristics make Exide-Ironclad Batteries your best power buy . . . at any price.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

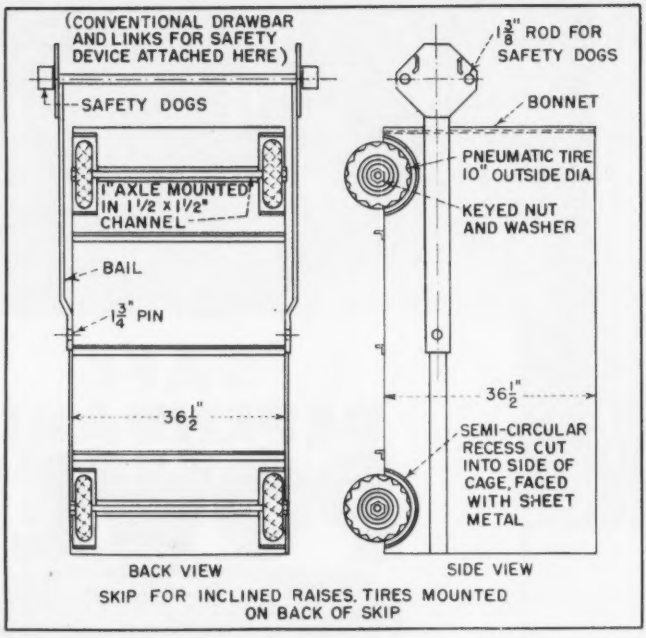
"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950

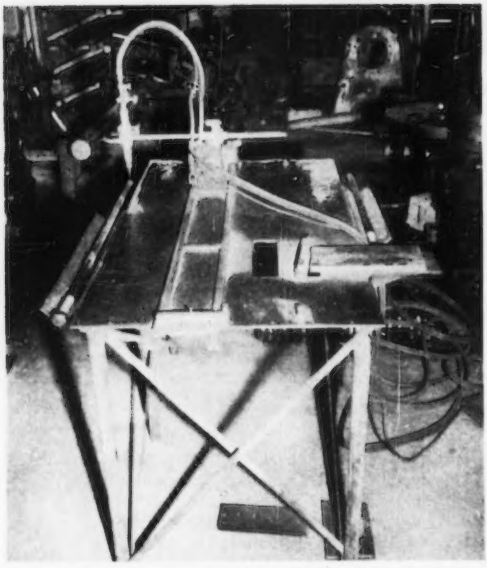
Rubber-Tired Wheels Result in Smoother Skip Travel

Rubber-tired wheels attached to skips at the Akron Unit of Callahan Zinc-Lead Co., White Pine, Colo., have resulted in much smoother skip travel in inclined raises. The pneumatic tires are 10 in. in diameter and are attached to 1-in. axles by means of keyed nut and washer assemblies. The wheels travel on 4x10-in. timbers which are mounted on footwall plates of the raise and serve as tracks. All other elements of the cage are of conventional design, including the bail, crosshead, safety device and safety dogs.

Skip wheel axles are welded to 1½x1½-in. channels, which in turn are attached to the back of the skip. The rubber-tired wheels are recessed in semi-circular cutouts as shown in the accompanying sketch. The sides and perimeters of the semi-circular recessed areas are faced with sheet metal welded in place. Wooden guides are mounted on the end plates of the raise to perform the usual function of guiding the skip and serving as a gripping surface for safety dogs in event of rope breakage.


(CONVENTIONAL DRAWBAR AND LINKS FOR SAFETY DEVICE ATTACHED HERE)
SAFETY DOGS
1"AXLE MOUNTED IN 1 1/2 x 1 1/2" CHANNEL
BAIL
1 3/4" PIN
36 1/2"
1 3/8" ROD FOR SAFETY DOGS
BONNET
PNEUMATIC TIRE 10" OUTSIDE DIA.
KEYED NUT AND WASHER
36 1/2"
SEMI-CIRCULAR RECESS CUT INTO SIDE OF CAGE, FACED WITH SHEET METAL
BACK VIEW
SIDE VIEW
SKIP FOR INCLINED RAISES. TIRES MOUNTED ON BACK OF SKIP

How to Make Your Own Roof Bolts



ROOF-BOLT-AND-WEDGE-MAKING assembly includes a work-bench, steel troughs for holding bolts, a jig for wedge-cutting and a traveling cutting flame.

All the roof bolts, roof-bolt wedges and plates currently needed at the company's mines are being made in the central shop at the East Diamond mine of the West Kentucky Coal Co., Madisonville, Ky.

A workbench with jigs and troughs and an Airco Radiagraph are the principal components of the bolt-and-wedge-making assembly, shown at the left.

The bolts are made of 1¼-in. steel rods, threaded on one end and in three different lengths. The threaded bar is laid in one of two troughs on either side of the workbench, depending on length of bolt to be made. The troughs are welded to the table so that when the steel bar is cradled, the flame from the Radiagraph, moving along a fixed track, cuts a 1/16-in. slot in the unthreaded end of bar. The track may be moved to either side of the workbench center, but whichever side it is on, it guides the Radiagraph down the center of the rod.

Wedges are made on the same workbench with the help of a jig. The jig is set at an angle to the center line of the workbench so that the Radiagraph flame, moving straight down the workbench, cuts a wedge of the right shape from a steel plate held flush against the angled jig. After each wedge is cut off, the steel plate is turned over and the flame passes over it again. This is repeated until the length of plate is used up or until enough wedges have been cut.

Plates for roof bolts are made of any scrap steel that happens to be lying around the shop or yard.

The Radiagraph operates on 220 v. ac. or dc., 5 amp. Speed of travel is 1 to 50 fpm. Courtesy Coal Age.

All these Valves . . from One!

Valve combinations for 90% of industrial piping assembled with 4 bodies and a handful of parts.

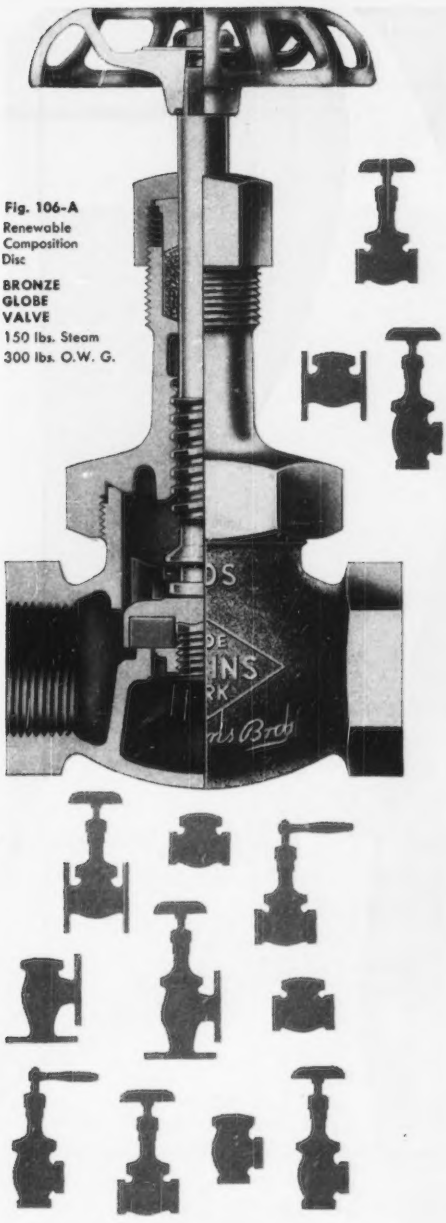


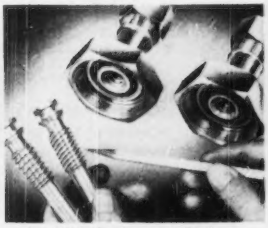
Fig. 106-A
Renewable Composition Disc

BRONZE GLOBE VALVE
150 lbs. Steam
300 lbs. O.W. G.

JENKINS FIG. 106-A "FAMILY"

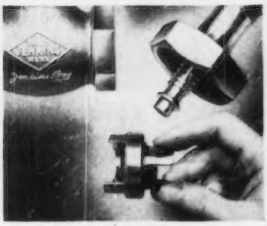
Start with the standard Fig. 106-A. Trimming is interchangeable in Globe or Angle body, screwed or flanged.

For Close Control — In throttling service, the nut which holds the disc in the disc holder is removed and replaced with Throttling Nut, Fig. 344.



For Quick Opening and Closing — Merely substitute the bonnet and spindle from Fig. 941, in which threads are pitched more sharply.

For Lift Check Service — Globe or Angle Bodies can be fitted with interchangeable Cap, Disc Holder, and Guide Disc Nut from Fig. 117A. Addition of spring from Fig. 655A provides spring loaded service.



For Stop & Check Service — Use the 106A trim, but substitute this spindle from Fig. 630A and replace the regular disc nut with the check valve guide disc nut.

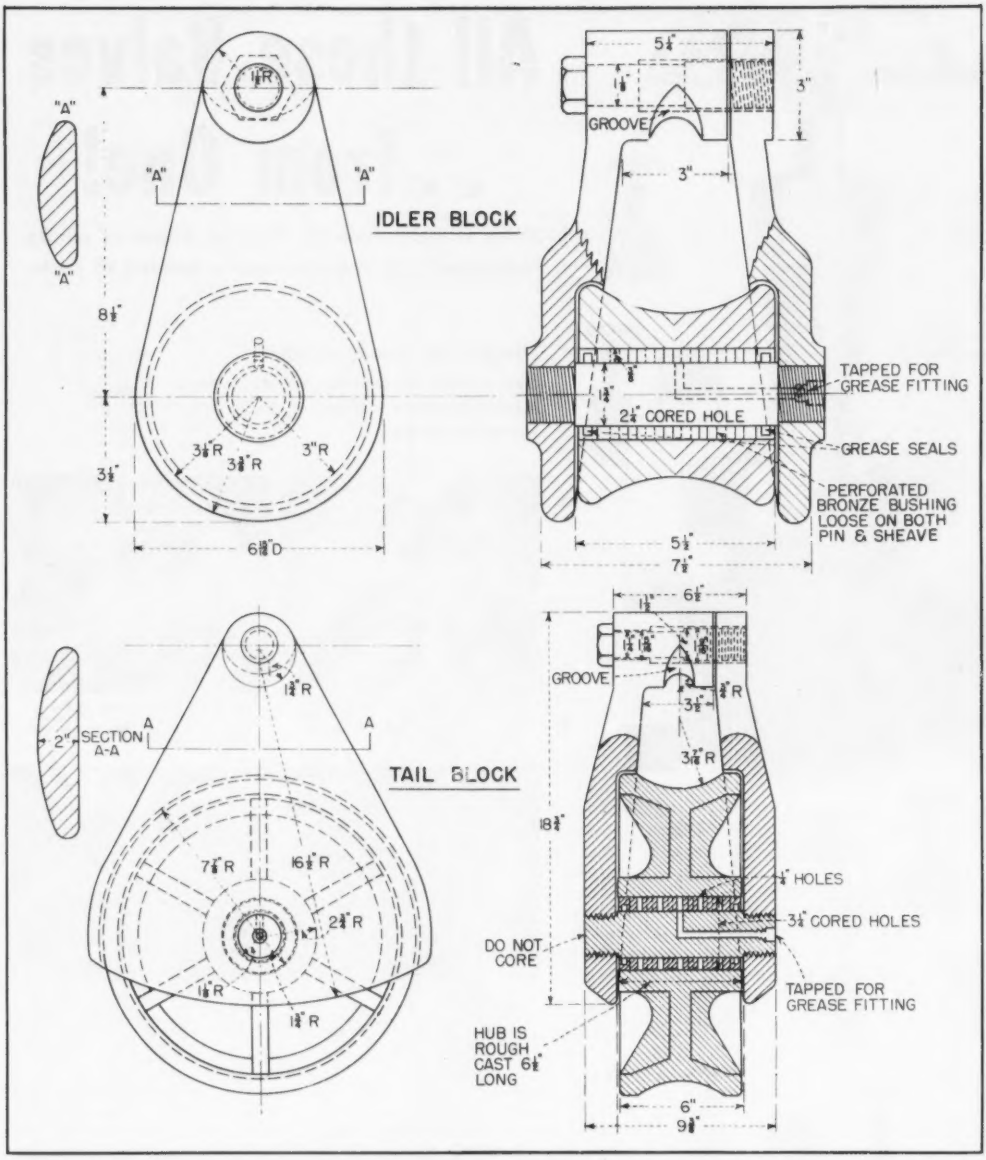
Look over these pictures and see how easy it is to make up just the valve type you need, simply by interchanging parts. Think of the saving this means in maintenance expense . . . in reduced inventory of spare valves in your stockroom.

That's a big reason why the Fig. 106-A series takes top honors in any poll for valve preference. And Jenkins time-proved design, makes them the longest-lasting, lowest-upkeep valves that money can buy.

For example, see the heavy construction of the one-piece, screw-over bonnet. You can remove and replace it over and over again without distortion. See the extra size packing box,—and the perfectly machined threads on the heavy manganese bronze spindle, with more threads in contact with the bonnet, open or closed.

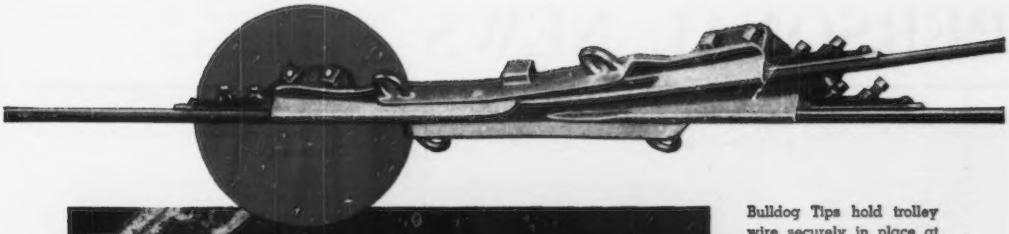
Remember, Jenkins Bros. is the originator of the renewable composition disc valve,—the *only* manufacturer of both valves *and* discs. For drop-tight, trouble-free performance, get acquainted with the Fig. 106-A "family". Despite their extra value, *you pay no more* for Jenkins Valves. Jenkins Bros., 100 Park Ave., New York 17, N. Y. Jenkins Bros., Ltd., Montreal. Sold through leading Industrial Distributors.

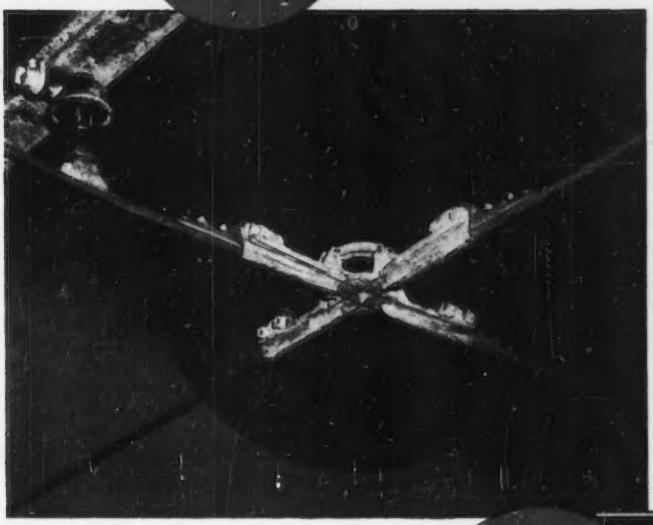
JENKINS
LOOK FOR THE DIAMOND MARK
VALVES



Sturdy Idler and Tail Block Reduce Scraping Costs

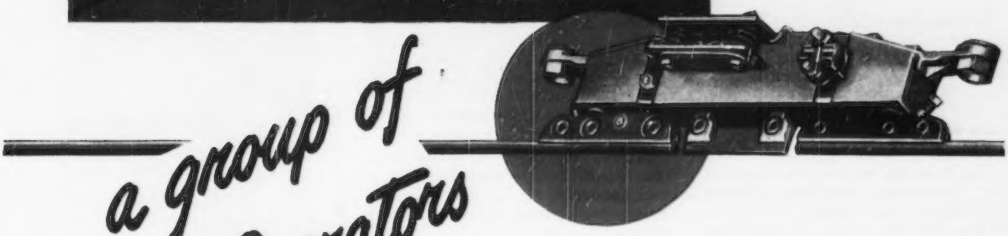
The idler block and the tail block shown were designed by H. J. Clemmer, mechanical and electrical superintendent, Chelan Division, Howe Sound Co., Holden, Wash., for use in slusher drifts. In conjunction with the special hinged scraper evolved by Mr. Clemmer (E&MJ, July, 1947, p. 85), the two units have helped much to speed up scraper operations, and because of their sturdy design, wear and repairs are kept at a minimum. The sheaves and shells are cast alloy steel machined and assembled at the mine machine shop. The sheave pins are fitted with lubrication channels, with one pin end tapped for grease fitting. The perforated bronze bushings have grease seals and operate loose on the pin and in the sheave. Both units have the split pulley feature incorporated in their design. The cable can be placed onto the sheave inside the shell in a very short time by simply unscrewing the bolt at the top of the shell and swinging down the detachable member of the shell as shown above.





Bulldog Tips hold trolley wire securely in place at the approaches to Frogs and Crossovers without interfering with the wire-smooth collector path.

Trolley wire enters Section Switches and Insulators through End Runner Clamps which provide a single-level collector path.



a group of Smooth Operators

That's what these O-B Overhead Trolley Fittings are, and their success is largely due to their smooth approach! It's all in the way in which the collector is led into and away from the fittings. Bulldog Tips and End Runner Clamps grip only the upper lobe of formed trolley wire without changing the level of the collector path; without obstructing the path in any way.

With no wire-encircling grip; with no jog between the wire and the fitting, the collector enters and leaves any O-B Smooth Underrun Fitting on a wire-smooth, wire-level path.

This is the "Smooth Approach" for smooth operation!

Specify O-B for your overhead trolley fittings, and you'll have the right approach to the problem of maintaining trouble-free current collection in your mines. No arcing, bumps or rough spots anywhere in an O-B overhead system of smooth underrun fittings. An O-B representative will be glad to help select the equipment needed for your particular haulage way.

4056-M

Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

PERSONAL NEWS

MINING ENGINEER Grant T. Hollett (left) of Cleveland Cliffs Iron Co.'s Mather "A" shaft, is greeted by John M. Haivala, mining engineer at Mather "B" shaft, as the 6th level, "A" shaft, holes through to Mather "B" drift approximately 400 ft. west of "B" shaft. The 6th level was driven by Mather "A" crews 8,600 ft. to unite these two shafts. Connection was made within 1 ft. for location and 0.1 ft. for elevation.

William Jones, who served in various capacities in the Vermillion district for Oliver Iron Mining Co., has retired after 41 years with the company. At the time of his retirement, he was doing safety supervision and claim work.

Rollien R. Wells has been transferred from the mineral dressing section, Northwest Electrodevelopment Laboratory, U. S. Bureau of Mines at Albany, Ore., to Juneau, Alaska, where he will head the Ore Dressing Branch of the USBM. **A. W. Hackwood** is chief of the metallurgical division and **S. H. Lorain,** regional director, at Juneau.

Joseph T. Yavitz, president of Loewenthal Metals Corp., has announced the promotion of **J. A. Leroy** to vice president, and the appointments of **Embe K. Alexander,** in charge of production, and **George Libles** as representative in the western territory.

Charles E. Dworjack-Graham is chief mechanical engineer for the Orinoco Mining Co., Puerto Caroni, Ciudad Bolivar, Venezuela. He was formerly metallurgist with the Metales Occidentales at Medellin, Colombia.

Dr. Hans H. Bleich has been appointed associate professor of civil engineering at Columbia University.

Arthur V. Bender, who began his career with the National Lead Co. in 1939 as industrial engineer for the Titanium Division, has been appointed chief engineer for the company.

Harold Lake, mining engineer in the Nelson district of British Columbia, has been appointed general manager of the Canadian Exploration Co.'s Jersey lead-zinc (Emerald) operation near Salmo. He succeeds **R. E. Legg** of Vancouver.

Malcolm W. Clark, formerly with Atlas Steels Ltd., Welland, Ont., has been appointed to the metallurgical section, engineering division, British Columbia Research Council.

Clifford McIntosh, assistant chief engineer, was appointed chief engineer of the Arthur Iron Mining Co., effective Oct. 1. He succeeds **C. J. Calvin,** chief engineer and vice president of the company.

Ralph A. Watson, geologist with the Anaconda Copper Co., has been appointed assistant geologist with the Great Northern Ry Co. He succeeds **A. L. Greenlee** who has resigned and will be located at Spokane.

Robert Crist has been promoted to assistant superintendent in the Cooley district mines of the M. A. Hanna Co. He succeeds **Bob Wallace,** who has been transferred to the Mississippi group in the same capacity.

Edward C. Leonard, Ishpeming, has been appointed acting safety director of Inland Steel Co.'s iron mines and limestone quarries in Michigan. He succeeds **John H. Strome.**

William A. Bauman, mining engineer, is now with the Pickands Mather & Co. engineering department at Ironwood.

Alfred H. Drewes, assistant to the president of National Lead Co., has been named a director and member of the executive committee.

Paul W. Zimmer has recently resigned as geologist of the Chateaugay District, Republic Steel Corp. to accept a position as geologist for the St. Joseph Lead Co., Edwards Division, Balmat, N. Y.

C. DeWitt Smith, formerly research and development engineer at the Southeast Missouri lead mining operations of St. Joseph Lead Co., has been made superintendent of mines at the company's Northern New York zinc mines at Balmat and Edwards, N. Y.

F. J. Haller, formerly superintendent of Cleveland-Cliffs Iron Co.'s Mather mine has been promoted to manager of all Michigan mines. **James S. Westwater** has succeeded him at the Mather mine, and **Hugo Korpinen,** who has been underground superintendent is now assistant superintendent.

C. A. BOTSFORD, mining consultant for the Economic Cooperation Administration mission to Italy, at Rome, since April, has been transferred to the ECA mission to Greece at Athens.

M. A. Jorgenson, formerly mill superintendent for the Buchans Mining Co., Ltd., of Newfoundland, and recently associated with the Colorado School of Mines Research Foundation, Inc., has been appointed mill superintendent by the Triumph Mining Co., Triumph, Idaho.

William J. Loring, president and general manager of Nevada Uranium Production Co., whose mine is located at Round Mountain, Nye County, has resigned. **Edward R. Hines,** of Chicago, Ill., has succeeded him. Mr. Loring will continue as consulting engineer.

Juan German-Ribon, director of the Compagne Aramayo de Mines in Bolivia, sailed recently for South America.

Dr. E. S. Hedges, director of research of the International Tin Research and Development Council, and **W. R. Lewis,** development manager of the Tin Research Institute, London, Eng., are spending some time in the United States and Canada. While in this country they are making their headquarters at the associated American organization, Tin Research Institute, Inc., in Columbus, Ohio.

Sir Lewis L. Fermor has been elected president of the Council of the Institution of Mining & Metallurgy for the session 1951-52. He was director of the Geological Survey of India from 1932 until his retirement in 1935, and has been engaged in consulting work in India, Malaya and Africa since that time.

Marion W. Boyer has been appointed general manager of the U. S. Atomic Energy Commission. He replaces **Carleton Shugg,** who has been serving as acting general manager since the resignation of **Carroll L. Wilson** in August. Mr. Wilson has resumed his post as deputy general manager. Mr. Boyer has resigned his position as vice president in charge of manufacturing for Esso Standard Oil Co.

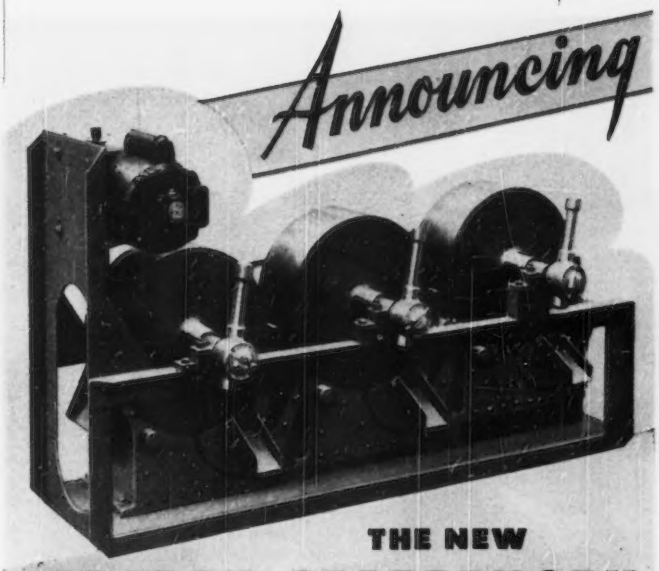
Jesse C. Johnson, manager, Raw Materials Operations, U. S. Atomic Energy Commission; **Frank McQuiston,** special advisor to Mr. Johnson, and **A. A. Wells,** special assistant to the AEC General Counsel, were recently in Johannesburg, South Africa, to represent the United States in discussions with Union authorities in regard to the production of uranium from South African gold-bearing ores.

Lewis D. Clark, of Kingston, Ont., has been appointed assistant professor of mining at Lafayette College. Since 1949 he has been exploration engineer for Kennco Explorations, Ltd., Montreal. **Robert R. Jones,** of Plymouth, Mass., has been named instructor in metallurgy and **Henry J. Petrie,** of New York, has been appointed instructor in mining.

J. Jesus Prado is now associated with the Institute Nacional para la Investigacion de los Recursos Minerales de Mexico, an official organization in Mexico City, whose function is the investigation of the mineral resources of the country in all aspects.

Neil A. O'Donnell, executive vice president and general manager of Idaho Maryland Mines for the past six years, has resigned. **Charles L. Allen** has succeeded him.

Russell L. Jose, formerly assistant superintendent at the Ironton mine, has been appointed superintendent of the Anvil-Palms mine, at Bessemer, Mich. He succeeds the late **E. C. Carlson.**



THE NEW

JEFFREY-STEFFENSEN

LABORATORY MAGNETIC SEPARATOR

For the concentration and recovery of finely ground magnetite or ferro-silicon in mineral dressing laboratories, Jeffrey has developed a NEW laboratory unit, employing the patented Jeffrey-Steffensen counterflow principle of magnetic separation.

In actual tests on pilot plant and production basis, the Jeffrey-Steffensen Magnetic Separator has proven itself superior for the production of slime-free concentrates of the highest possible grade from fine feeds.

The Type 125 Laboratory Separator shown above offers a COMPLETE TOOL for research and development of this nature.

Features:

Unit is Available in 1, 2, 3 or more sections. Three-drum size is shown above.

Each section is integral being independent of other sections except for drive. All sections interchangeable.

In the laboratory it is possible to remove one or more sections . . . any number of sections can be used for any given test.

Driving gear motor is mounted above level of the drums themselves so that it is out of all possible splash.

Removable plug in bottom of each section provides a means of cleaning out material from machine at end of each test.

Additional data upon request.

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VICTAULIC
PIPE COUPLINGS AND FITTINGS

Vernon E. Scheid, head of the department of geology at the University of Idaho, has been named dean of the Mackay School of Mines, University of Nevada. He will take office Feb. 1, 1951. He has also been appointed director of the State Bureau of Mines. **Prof. J. A. Carpenter** will continue as director of the Mackay school.

PRESENTATION OF THE FIRST COPY of a new edition of De Re Metallica is made to Ex-president Herbert Hoover (right) by Hayward Cirker (left), president of Dover Publications. Mr. Hoover translated the work more than 30 years ago with the assistance of his late wife, Lou Henry Hoover. For review of this famous book, now available, please turn to "New Books," p. 127.

Harold A. Montag, assistant to the president of Joy Manufacturing Co., has been appointed a consultant in the defense program of the Department of the Interior, according to an announcement by Secretary **Oscar L. Chapman.** Mr. Montag will advise the defense agencies in the Department in connection with equipment and supplies for assuring maximum output of mines.

M. S. Stevens, formerly manager of Hard Rock Gold Mines, Ltd., Geraldton, Ont., has resigned and is now located at 143 Allen St., N., Oakville, Ont.

Neil Whiting, mining engineer, is the new mines superintendent of the Maryland and Brunswick properties of Idaho Maryland Mines Corp. He succeeds **J. C. O'Donnell.**

S. W. Smith, superintendent of the open-pit operations of the Nevada Mines Division of Kennecott Copper Corp. at Ruth, has been made mine superintendent. **R. C. Nispel** has been appointed assistant superintendent at the open-pit mine.

Martin S. Stevens, recently manager at Hard Rock, Gold Mines, Ontario, has been appointed chief inspector of mines for the Province of Saskatchewan, Canada.

Delbert Kay, advertising manager at Nordberg Manufacturing Co., has resigned under a company retirement plan. **J. D. Grace,** manager, advertising and sales development department, has succeeded him.

Charles Will Wright recently spent a week at Rifle, Colo., with his son, **Fred,** who is an engineer at the USBM oil-shale mine.

Frank J. Smith has been elected vice president in charge of iron ore operations of Oglebay, Norton & Co. Mr. Smith joined the company in 1908, worked for many years at various properties on the Menominee, Gogebic, and Cuyuna ranges, and in 1942 was named range manager in charge of all iron ore operations managed by the company.

Ronald C. Rutherford, consulting engineer of Los Altos, Calif., has left for Turkey, where he will spend four months surveying mines at Bolkardag and Keban, to determine the feasibility of reopening them and constructing a smelting plant. The survey is sponsored under the technical assistance program of the Economic Cooperation Administration.

Arnold H. Miller, consulting engineer of New York, left for Europe on Nov. 10, where he will be engaged in professional work for a month. His itinerary includes Spain, French Morocco, Italy, France, Western Germany and England.

E. S. McGlone, vice president in charge of western operations of Anaconda Copper Mining Co., and **Kuno Doerr, Jr.,** manager of the East Helena plant of the American Smelting & Refining Co., were recently elected members of the governing board of the Western Division, American Mining Congress. Mr. Doerr is secretary of the Montana Mining Association.

J. C. Kinnear, Jr., is the newly-appointed general manager of the Nevada operations of Kennecott Copper Corp., at Ruth, Nev. He succeeds **Walter Larsh,** who has retired. **Paul Hett,** general superintendent, is now assistant general manager of the company's Nevada copper mining operations.

OBITUARIES

DR. CLAUDE E. NEEDHAM, chief of the mineral statistics branch of the U. S. Bureau of Mines regional office at Amarillo, Tex., died Oct. 15 at his home. He was well

at the working face . . .

GIVE 'EM AIR

at the lowest possible cost!

Above ground it's free, but down in the bowels of the earth, where men mine the pay-lode or build tunnels for the benefit of humanity, *AIR* and its *DELIVERY COST* are vital factors.

SPIRATUBE-M and AYRTUBE cut Air *Delivery Costs.* Made specifically for mine and tunnel ventilation, these two new *AIRDUCTS* working individually or in combination, deliver a maximum cubic measure of air right at the working face and at the lowest possible cost—because—ease of handling reduces installation costs, and construction features minimize leaks and seepage. You get the full volume created by your fans and blower units right where you need it—at the working face—reducing power costs.

Immediately available in tough high count jute and other fabrics, all specially treated and heavily coated inside and out to withstand fungus and mildew and rough usage.

Extremely flexible special (patented) built-in couplings eliminate fabric mangling—parts are never laying about to create accident hazards.

SPIRATUBE-M and AYRTUBE save labor—cut fatigue—step up output—cut maintenance costs.

SPIRATUBE-M — (DIAMETERS to 30 INCHES) Especially designed for both positive and negative pressure, or reversible systems. Replaces rigid ducts. Offers great savings in shipping, installation, maintenance, and storage costs. Patented concealed spring wire construction springs to work and stays extended. Built-in quick couplings with joints lock ringed against blast concussion. No fittings required for turns or bends.

AYRTUBE — (DIAMETERS to 36 INCHES) Heavy duty pressure ventilation tubing without wire reinforcement. Quick coupling ends and lock rings interchangeable with SPIRATUBE-M. Materials and constructions meet Flexible Tubing Standards. Full line of special fittings available.

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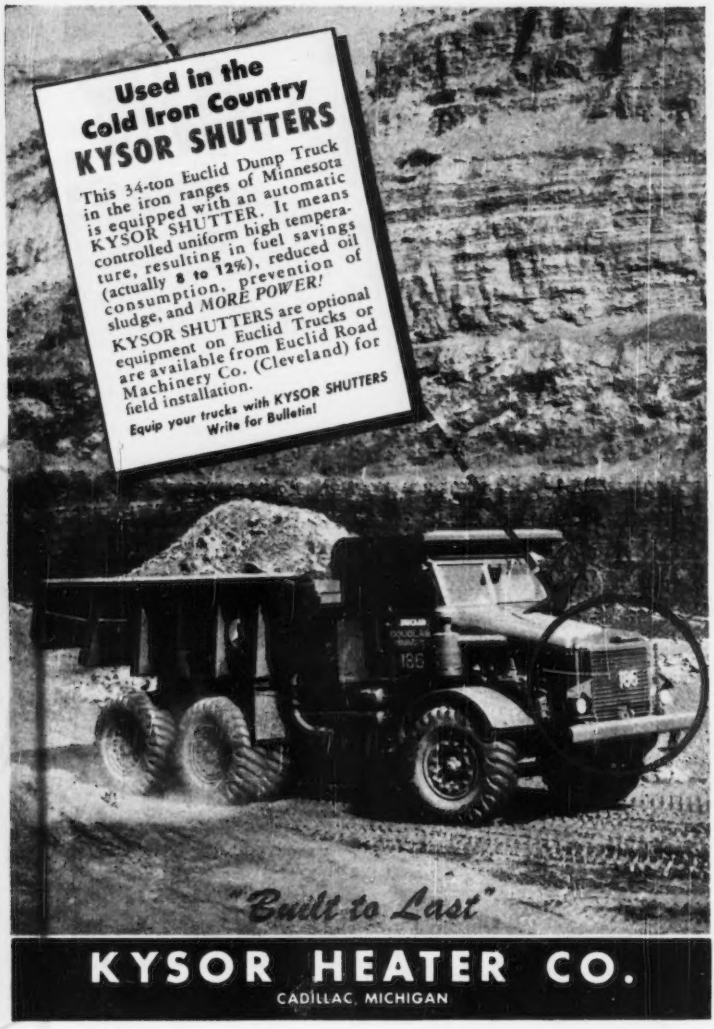
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KYSOR SHUTTERS
This 34-ton Euclid Dump Truck in the iron ranges of Minnesota is equipped with an automatic KYSOR SHUTTER. It means controlled uniform high temperature, resulting in fuel savings (actually 8 to 12%), reduced oil consumption, prevention of sludge, and MORE POWER!
KYSOR SHUTTERS are optional equipment on Euclid Trucks or are available from Euclid Road Machinery Co. (Cleveland) for field installation.
Equip your trucks with KYSOR SHUTTERS
Write for Bulletin!
"Built to Last"
KYSOR HEATER CO.
CADILLAC, MICHIGAN

known throughout the mineral industry for his work in sedimentary petrography, stratigraphy and mineral economics. After teaching geology at Mississippi State College, and Northwestern University, he went to Socorro, N. M., as assistant professor of geology at New Mexico School of Mines and became president of that institution in 1939. In 1942 he went to Washington, D. C., as a senior economic analyst. Dr. Needham later served for five years as supervising engineer of the Economics and Statistics Branch at Salt Lake City, Utah. He contributed technical articles to many professional journals and Bureau of Mines publications, and was editor of the Minerals Yearbook from 1943 to 1945. He was a member of the AIME, the new Mexico Miners & Prospectors Association and other associations.

John C. Gaul, 63, formerly assistant general superintendent of mines, Anaconda Copper Mining Co., died suddenly in Seattle, where he was visiting on Oct. 23. A native of Calumet, Mich., he was a graduate of Colorado School of Mines. Since retirement in 1945, he had spent most of his time traveling in the West.

Arthur C. Green, director and vice president in charge of sales, Goodman Manufacturing Co., in Chicago, died Oct. 31. In mining circles throughout the country he was recognized as an authority on mining practices, and he had devoted his entire business life to interests associated with the industry. He was a member of the American Institute of Mining & Metallurgical Engineers and the Lake Superior Mining Institute.

Walter A. Lammers, for the past several years resident engineer at the Privateer mine, Zeballos, Vancouver Island, died recently following a lengthy illness. He was 40.

Robert K. Matheson, 41, died recently. He graduated in mining engineering from the University of British Columbia in 1935, and had worked for Bralorne Mines, Ltd., Desert Silver, Inc., Cordero Mining Co., Coronado Copper & Zinc Co., and United States Potash Co., Carlsbad, N. M.

Charles A. Geatty, 67, director of National Lead Co. and former manager of its metal department, died Oct. 10. He joined the company in 1928 as assistant manager of the Baltimore branch and later became company manager of metal sales. In 1940 he was elected a director and member of the executive committee. In 1948 he retired.

LETTERS

Re Pebble Milling

Dear Sir:

In the October issue of your Journal, the M.B.D. session of the Salt Lake City meeting was reported on page 110. The Lake Shore paper on pebble mill grinding was reviewed and the statement made, "Country rock is used, crushed and sized at the mine. . ." We feel that this statement would give a wrong impression to the outsider.

The pebbles are obtained from the regular ore as hoisted and delivered to the crusher house. No additional crushing is done to make pebbles and they are obtained in the routine screening of crusher house feed to remove fines before crushing. The top decks of the screen, which are used to remove minus-½-in. material, are varied to give us the pebble size desired. (But some screens would be necessary in any case to remove the coarser fractures before the ½-in. size is reached.) The tonnage of ore removed and used as pebbles does not require additional crushing and grinding, and represents a saving of approximately 50c. per ton. The only cost is that of the conveyors and storage bin, etc., to handle the pebbles.

The reduction in cost comes from obtaining our grinding media at a saving instead of paying $120.00 per ton for it.

B. S. CROCKER, *Mill Supt. Lake Shore Mines, Ltd.*
Kirkland Lake, Ontario.

Drilling Records Reported

Gentlemen:

In your issue of July, 1950, you ask for a few drilling records, made with hand tools.

On Oct. 2, 1909, there was a double hand drilling contest held at Goldfield, Nev. The drilling was done in a rock classified as "Alaskite" and the results follow:

Distance, In.	Drillers	Time, Min.
46⅛	McCormack & Chisholm	15
53-7/16	Jalich & Burns	15
53-1/16	Ross & Jones	15
49½	Johnson & Sander	15
42¼	Hoxie & Baker	15
49¼	Amson & Forsham	15

On July 4, 1912, the same kind of drilling contest was held at Tonopah, Nev. The drilling was done in a rock classified as "Rocklin Granite" and the results follow:

45-7/16 in. by Page & Pickens in 15 min. In this contest these men averaged 66 hammer blows per min.

38-7/16 in. by Porter & Goddard of Oatman, Ariz.

41-7/16 in. by Lundquest & Dahlin of Victor, Colo.

In the contest recently held at Tonopah, your Journal reports Blake & Hardwood of Virginia City made 15-11/16 in. in 10 min.

You will notice Page & Pickens made an average of 3.029 in. per min., whereas Blake & Hardwood made an average of only 1.506 in. per min. You must also consider the last five minutes of the Page & Pickens drilling was the hardest, as the steady grind at high pressure could not help but wear them down to some extent.

It goes to show that hand drilling is on the way out, and it is doubtful if the old-time records will ever be equaled.

F. E. BROWNE

Auburn, Calif.

P.S.—During the early days of Goldfield, Nev., I reported the news for the E&MJ—about 1905-1906.

Quemont's Gold and Silver

The Editor:

In the section on "The Mill" ("Quemont—Designed Today for Tomorrow's Production," Oct., p. 75) the figures on average monthly production are confusing with reference to gold and silver.

Many readers would assume that we produce 10,000 oz. of gold and 35,000 oz. of silver in addition to the gold and silver contained in the copper concentrate, whereas these figures really represent total gold and silver production. To clear the matter satisfactorily, the monthly production averages may be summarized thus:

1,880,000 lb. of copper
1,236,000 lb. of zinc
10,000 oz. of gold
35,000 oz. of silver
9,300 tons of pyrite @ 48% sulphur

A. G. BALLACHEY, *Mgr.*
Quemont Mining Corp., Ltd.
Noranda, Que.

USE REAGENT HF?

Look at ALL the Advantages

Exclusive B&A SAFTEPAK†

Gives You for Maximum Utility—for Maximum Safety

SAFTEPAK Plastic Bottle for B&A Reagent HF now widely adopted by Leading Laboratories

1. OUTSTANDING POURING CONTROL
Pours drops, needle stream, or full flow, depending on your requirements.

Accurate measure . . . "siphon action" pour-out draws back into bottle any drops clinging to lip when pouring stops.

Translucent . . . acid level always visible.

Easy to handle . . . the *Saftepak* with its sturdy encircling label band fits conveniently into your hand for easy pouring.

2. ACID RESISTANT—Bottle and pour-out made of special plastic highly resistant to aqueous HF.

3. SHATTER-PROOF—Bottle is pressure-molded of shatter-proof plastic . . . does not become brittle, crack or break as do ordinary wax containers. Will not shatter or smash even under heavy impact.

4. SCREW-TIGHT CAP—Provides easy reclosure; safeguards against possible spillage or leakage; protects Reagent A. C. S. purity of the acid.

IF YOU ARE among the very few who have not yet switched to B&A Reagent HF in the Saftepak dispenser, don't delay. Weigh the benefits you can get in safety and utility; then order your Reagent HF requirements from the nearest Baker & Adamson office today.

ONCE YOU'VE TRIED the B&A Saftepak you'll never want to buy HF in old-styled dispensers again!

†General Chemical Trade-Mark

REAGENTS B&A STANDARD OF PURITY FINE CHEMICALS

BAKER & ADAMSON *Reagents*

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Offices: Albany • Atlanta • Baltimore* • Birmingham* • Boston • Bridgeport* • Buffalo* • Charlotte* Chicago* • Cleveland* • Denver* • Detroit* • Houston* • Jacksonville • Los Angeles* • Minneapolis New York* • Philadelphia* • Pittsburgh* • Providence* • St. Louis* • San Francisco* • Seattle • Yakima (Wash.) In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks are carried here.

Sintering Machinery Corp.

NETCONG, N. J.

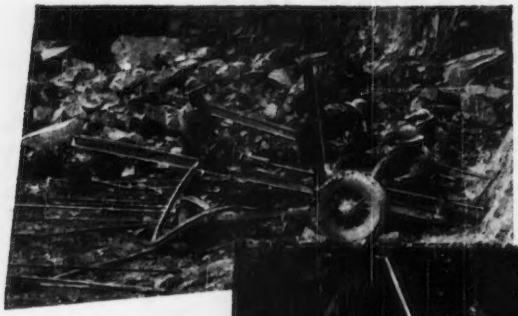
Manufacturers of

DWIGHT-LLOYD* SINTERING MACHINES
*TRANSPORTOMETERS
SINTERITE* PELLETIZERS
TIRRILL GAS MACHINES

*Trade mark REG. U. S. Pat. Off.

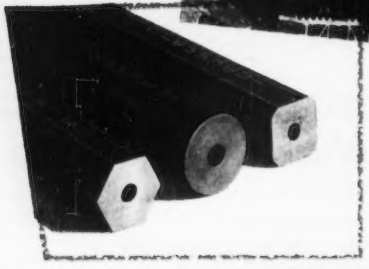
Sales Representatives for Sintering Machines

NICHOLS ENGINEERING & RESEARCH CORPORATION
70 Pine Street — New York 5, N. Y.



you can't beat

CRUCIBLE HOLLOW DRILL STEEL for LONG LIFE!



The *long life* of Crucible Hollow Drill Steel . . . even under the severest drilling conditions, is the reason why you get *lower cost per foot drilled* when you use this high quality drill steel. This is no idle claim! Controlled hardenability, perfection of stress-bearing surfaces and uniform processing all contribute to your assurance of maximum performance.

But even more! *Every lot* of Crucible Hollow Drill Steel is *pre-tested* for the harder, faster blows of modern drills. Cut down on costly job delay, and get the most out of your drilling equipment...specify Crucible Hollow Drill Steel.

Let Crucible Hollow Drill Steel answer your drilling problems. To help you cut drilling costs, Crucible makes freely available to you an alert metallurgical staff. These engineers and metallurgists are well qualified from long experience to show you how Crucible Hollow Drill Steel can best fit your requirements. Take full advantage of Crucible's half century of specialty steel leadership. Put us to work — working for you! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

HOLLOW DRILL STEEL

fifty years of Fine *steelmaking*

HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

E & M J

NEW PRODUCTS DIGEST

For further information on these products, circle item numbers on card—insert and mail.

PREVIEW

Army Tests Light Compact, Blasting Machine

YOU CAN READ for yourself what happened when we tried to pin this item down. It all started with a release from the Army Engineers.

FROM TECHNICAL INFORMATION SERVICE
Engineer Research & Development Laboratories
Fort Belvoir, Virginia

Fort Belvoir—Operator skill has no effect on a new blasting machine recently devised by demolitions experts at the Engineer Research and Development Laboratories. Providing a heretofore unavailable reliability and sureness of functioning, the new "M-2," 50-cap blasting machine is currently undergoing rigid military tests at the Army laboratories.

Lightness, compactness and ability to detonate charges under all tactical and climatic conditions varying from minus 65° F. to plus 125° F. are a few of the improvements realized over the present 50-cap blasting machine. Consisting of a springwound d.c. generator, the new machine is approximately half the bulk and weight of the machine now in use. In addition to being fitted for use in artic and tropical regions, the new M-2 is waterproof and capable of functioning in amphibious operations.

ENGINEERING AND MINING JOURNAL

September 20, 1950

Technical Information Office
Engineer Research & Development Lab.
Fort Belvoir, Va.

Gentlemen:

Thank you for your release on the new M-2 blasting machine. We know that our readers in the mining industry will be interested. Can you tell if this machine is available to industry in general and if so, who makes it?

Yours very truly,
New Products Editor

Engineer Research and Development Laboratories
The Engineer Center and Fort Belvoir
Fort Belvoir, Va.

27 SEP 1950

New Products Editor
Engineering and Mining Journal
330 West 42nd Street
New York 18, N. Y.

Dear Sir:

Your letter concerning the manufacturer and availability of the M-2 50-cap Blasting Machine has been received.

The device, which is being manufactured for the Engineer Research and Development Laboratories by the Fidelity Electric Co., Inc., Lancaster, Pennsylvania, is still in the military-experimental stage. Whether or not it may become available to the public at a later date is a question we are unable to answer at this time.

Very truly yours,
Technical Information Officer

25-CU. YD. BUCKET, one of the largest all-welded, automatic dragline buckets, is ready for shipment from Page Engineering Co.'s McCook (Ill.) plant, where it was manufactured.

Memos from the Manufacturers

- **A record-breaking 5,598,367 man hours (133 days) without a lost-time accident** moves the Pueblo steel plant of Colorado Fuel and Iron Corp. into the "Safety Hall of Fame."

- Americans with about 6% of the world's population **drive 51.6% of the world's trucks and buses.**

- **Action! Camera!** Kaiser Steel has produced a 22-min. film on steel making called "Strength in the West," while Euclid Road Machinery named their 20-min. epic, "The Garrison Story," a documentary on the Garrison Dam. Both are in color and available for exhibition to qualified citizens.

- According to AEC, **84 U. S. firms** are now manufacturing radiation detection equipment, parts and accessories.

- **Things to Come.** DuPont will invest $7,500,000 to build a chemical plant at Memphis. National Lead has contracted for two sulphuric acid plants, one in St. Louis and one in Sayreville, N. J.

General Electric Co.: Edgar A. Reiss named manager of manufacturing for Wire & Cable Division; Frederick R. Cronmiller appointed supervisor of budgets and planning for the Chemical Dept.; John T. Castles made manager of the Chemical Dept.'s silicone plant at Waterford, N. Y.; George Carlson appointed manager of New Kensington, Pa., works; Robert A. Hoffer, named engineering manager for the Plastic Division of the Chemical Dept.

The Okonite Co.: Kenneth T. Gordon, newly appointed purchasing agent, will also direct purchases for the company's Hazard Insulated Wire Works Division and the Okonite-Callender Cable Co. John L. Fabiny is new assistant purchasing agent.

American Brake Shoe Co.: William T. Kelly, Jr., recently appointed president of American Brakeblok Division, also continues as president of the Kellogg Division.

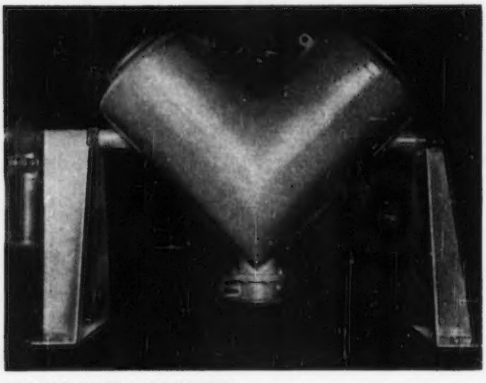
Buda Company of Harvey, Ill.: E. R. Galvin has assumed the duties of merchandise manager.

Hewitt-Robins, Inc.: Chicago locations have been consolidated at 402 W. Randolph St., according to announcement by L. D. Bigelow, vice president in charge of central division operations.

Independent Pneumatic Tool Co.: Two export corporations, Thor Tool Continental, Inc., and Thor Tool Hemisphere, Inc., organized to operate as sales and service branches in western Europe and South America; Donald E. Randall heads Sao Paulo, Brazil, branch.

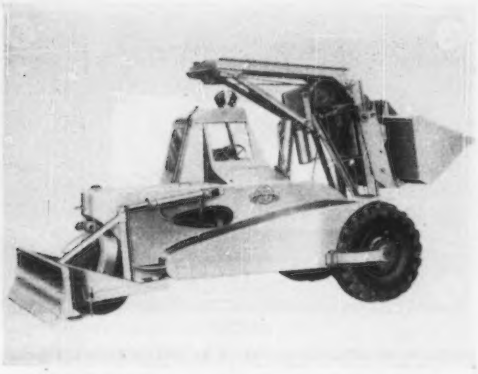
E. F. Houghton & Co., Philadelphia: Announces a change in location of its sales office from 68-70 Hudson St., Hoboken, N. J., to 55 W. 42nd St., New York.

American Cyanamid Co.: David T. Cornfoot appointed assistant to the manager, Boston office, Calco Chemical Division; and W. E. Small new assistant to the manager, Providence office; Cameron MacKenzie placed in charge of coordinating certain activities between the Calco plant at Bound Brook, N. J., and the Boston and Providence sales offices.

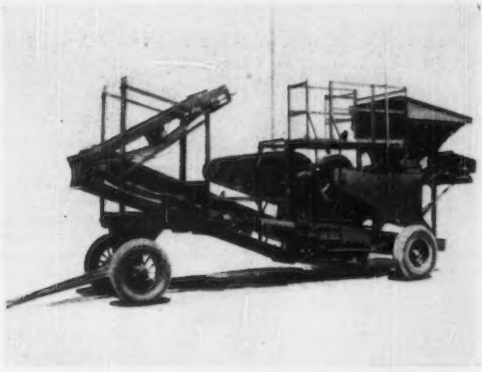


TWIN SHELL BLENDER rotates on horizontal axis and discharges through dust-tight valve at apex. Sizes range from 1 to 300-cu. ft. capacity, using ¼ to 20-hp. motors. Mixes any dry materials. P-K Co. (1)

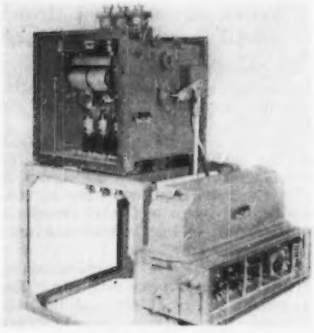
CONVEYOR comes in standard 10-ft. units with motor and control equipment Belts available are 8 to 36 in. wide. Install your own conveyor system to any desired length. Sage Equipment Co., Buffalo, N. Y. (2)



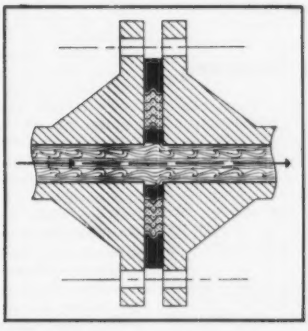
COMBINATION loader, dozer, truck and tractor has 84-in. dozer blade at one end, 1-cu. yd. scoop at other. Operator rides side saddle for better visibility. Uses 114-hp. engine. Mixermobile Mfrs., Portland, Ore. (3)



PORTABLE CRUSHING PLANT (single pass type) employes mechanical feeder, vibrating screen, jaw crusher. Conveyor blending material from screen and crusher can load trucks or stockpile. Pioneer Engineering Works. (4)

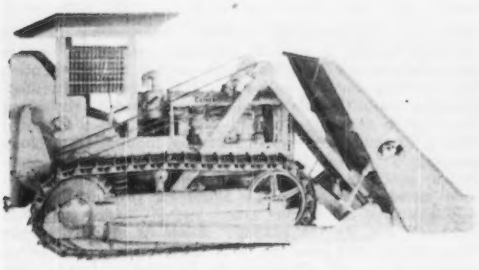


AUTOMATIC TRANSFER of load to standby diesel generator is made by 7500-v. switch when voltage drops to 65% of normal. G & W Electrical Specialty Co., Chicago, Ill. (5)

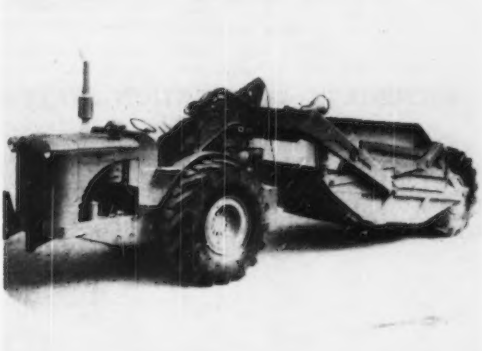


GASKET with special construction streamlines jointed connections, reduces turbulence and increases fluid flow. Flexitallic Gasket Co., Camden, N. J. (6)

THREAD RESTORER designed for work in close quarters anywhere, comes in range of sizes to handle all ASME and SAE threads from ¼ to 4 in. Buckingham Mfg. Co. (7)

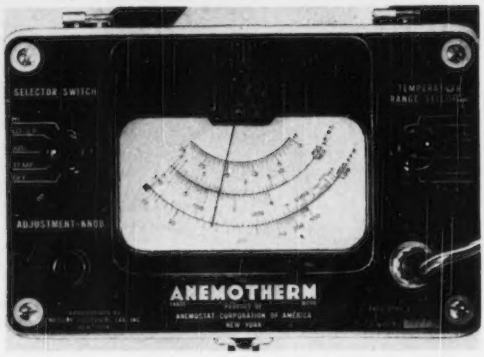


OVERSHOT LOADER can be readily attached to utility-sized tractors. Has rated capacity of one cu. yd. and a 20-sec. loading cycle. Will handle 125 yd. bank-run material per 50-min. hr. John Austin, Inc., Denver. (8)



MOTOR SCRAPER is self-propelled, rubber-tired, high-speed earthmover of 9 to 12-yd. capacity. A 145-hp. Buda diesel supplies power. Road speed is 23 mph. La-Plant-Choate Mfg. Co., Cedar Rapids, Iowa. (9)

EASY TO USE, the compact instrument takes the place of several instruments and saves time.



DIRECT READINGS are given by Anemotherm air meter, eliminating need for tables or extra calculations.

Here's One Instrument to Measure

- **Air Velocities**
- **Air Temperatures**
- **Static Pressure**

VENTILATION ENGINEERS will appreciate the Anemotherm Air Meter which combines a variety of functions in a single instrument with a wide range of application and high accuracy.

With this instrument they can measure temperatures and velocities of air motion in almost any part of the air distribution system. Velocity scales range from 10 to 6,000 fpm. Temperature readings can be made from 30 to 155° F. Static pressure can be measured from 0 to 10 in. W. G. positive, and 0 to 4 in. negative. The instrument is simple to use and gives direct readings in fpm., W. G. and degrees F.

Two components make up the Anemotherm air meter: (1) a sensing element—the probe; and (2) an indicating element—the meter, with batteries, switches and voltage regulating components contained in the instrument case.

The probe consists of 2 coils of fine nickel wire which connect through the cable to form the arm of a Wheatstone bridge inside the instrument case. One of these coils is heated by a separate current passing through a third coil of fine nichrome wire in thermal contact but electrically insulated.

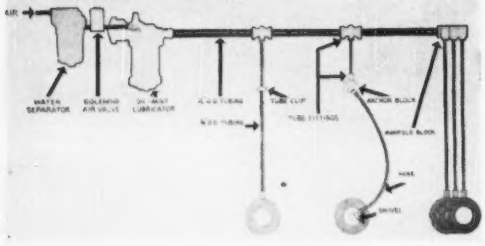
Air passing over the probe element cools the heated wire thus varying its resistance. Because of this, variations in air velocities are accurately indicated by the pointer on the velocity scales of the meter.

Temperature measurements are accomplished by means provided to disconnect the heater current. The unheated wire then acts as a temperature sensitive resistance in the bridge circuit. By using different resistors in connection with a temperature range selector switch, a considerable number of overalllapping scales, calibrated directly in degrees F., may be employed.

Measurement of static pressures is accomplished by a unique combination of probe and protective cap. The tip orifice of the cap permits entry of air, and the side orifice lets the air escape, passing over the resistance coils. When such an orifice is inserted through a small opening into a duct or plenum, the static pressure in the duct is converted into air velocity in the probe and read directly on the scale calibrated for that purpose.

Anemostat Corporation of America, New York, N. Y., makes the Anemotherm air meter. For further details, circle No. 10 on the addressed reply postcard opposite page 126, and mail. **(10)**

AUTOMATIC LUBRICATION SYSTEM



Mist Lubrication Uses New Principle

NEWLY ANNOUNCED Alemite "Oil Mist," a system of constant and automatic delivery of lubricating oil to all types of machines in "airborne" microscopic particles through tubing, is said to eliminate measuring devices and lubrication cycles, materially reduce oil consumption and increase machine efficiency. Hailed by the manufacturer as one of the most significant advances in lubricating methods in recent years, Oil Mist is reported to practically eliminate the human factor in lubrication, prolong bearing life, reduce bearing temperatures to permit stepped-up machine speeds and make down time for lubrication unnecessary. Coolant action is provided by the application of the correct amount of oil to prevent "fluid friction" and by the passage of air at slightly higher than atmospheric pressure, which also serves as protection against dust and abrasives on bearing surfaces. The Oil Mist lubricator attached to each machine is slightly smaller than the oil filter on an automobile, has no moving parts and utilizes only two controls.

Performance data and technical details are available from Alemite Div., Stewart Warner Corp., Chicago 14, Ill. Just circle No. 11 on the reply card opposite page 126 and mail as early as possible. **(11)**

For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

HOISTS. Complete description and specifications for the entire line of Joy single-drum, multi-purpose hoists with capacities from 500 to 3,500 lb., are contained in a 16-page bulletin (76-X) released by Joy Mfg. Co., Pittsburgh, Pa. A handy Select-O-Hoist chart simplifies the choice of any hoist to fill a particular need. (71)

STEEL HARDENING. Simple procedure for real gradient depth hardening of any kind of steel with a positive change in grain structure, by the Wilson process, is described and illustrated in Bulletin No. 13, distributed by Wilson Carbon Co., New York, N. Y. (72)

PROTECTIVE COATING. Corrosion and abrasion resistance superior to conventional zinc coatings with cost savings, is claimed for Zincilate, a one-coat, self-protecting coating described in an 8-page illustrated bulletin published by Industrial Metal Protectives, Inc., Dayton, Ohio. (73)

DIESEL ENGINES. New Buda DA Dyna-Swirl diesel engines especially designed for all types of heavy-duty trucks are described with detailed specifications of their various features in Bulletin 1506, a 16 pager offered by Buda Co., Harvey, Ill. (74)

CORE DRILL. All the information on the versatile Joy 22 HD heavy-duty diamond core drill is contained in bulletin D-28 of Joy Mfg. Co., Pittsburgh, Pa. The 2,000-ft. capacity drill can be driven by gasoline, electricity or compressed air and mounted on truck, steel skids or underground column. (75)

DIESEL CRAWLER. Here are 24 pages full of facts about and pictures of International Harvester Co.'s (Chicago, Ill.) TD-14A diesel powered tractor. The unit is in the 60 drawbar hp. class. (76)

PUMPS. A full line of pumps for handling corrosive and non-corrosive liquids, solids-carrying liquids and dry and semi-dry materials, is presented in a condensed 12-page catalog issued by Yeomans Brothers Co., Chicago, Ill. (77)

HOISTS. Booklet E-312 shows various types of Hi-Lift hoists and hoist cranes with close-up and sub-assembly views plus tabulated dimension data for different capacities. Issued by Northern Engineering Works, Detroit, Mich. (78)

METAL HOSE. Well organized and extensive technical and engineering data on flexible metal hose makes catalog 500 a valuable reference for your design and maintenance department. Released by Atlantic Metal Hose Co., New York, N. Y. (79)

PUMPS. Mission Mfg. Co., Houston, Tex., has an important message for you on the performance life, design and applications of their centrifugal pumps employing the Sherzer hydraulic principle of streamlined flow from concentric casing. (80)

ROOF TRUSSES. You can save time and timber, according to Timber Engineering Co., Washington, D. C., by using Teco trussed rafters in construction of your frame buildings. This 12-page bulletin gives you the what, how and why. (81)

CENTRIFUGES. For fast, continuous, economical separation of (1) liquids from solids or (2) immiscible liquids, perhaps the screen type or solid bowl type centrifuge discussed in this bulletin by Centrifuge Mechanical Equipment, Inc., Hoboken, N. J., is the unit you are looking for. (82)

DUST CONTROL. Operation of cloth tube type collectors, reported to recover 99% by weight of the fumes from roasters, sintering machines, induction furnaces, etc. Bulletin 282 makes the point that a wider selection of filter fabrics has increased the scope of cloth filtration. Issued by American Wheelabrator and Equipment Corp., Mishawaka, Ind. (83)

FIRE FIGHTING. This 24-page brochure on air foam for fire fighting, released by Pyrene Mfg. Co., Newark, N. J., describes air foam, types of foam compound, specifications and operating characteristics of 5 sizes of portable playpipes, and information about other accessory equipment. (84)

FILTER. Information on the Sweetland pressure filter with a listing of applications and structural details on different sizes, ranging from the laboratory unit's 1½ to 5 sq. ft. area to No. 12 unit's 480 to 1,000 sq. ft., is brought up to date in Bulletin 114, issued by Oliver United Filters Inc., New York, N. Y. (85)

TRICONE MILLS. Hardinge Co., Inc., York, Pa., has published a 12-page catalog on its recently developed Tricone mill, describing the operating principles. Included are a discussion of ball segregation, design features, performance data, typical flow sheets for both wet and dry grinding, and drawings and dimensions. (86)

TRANSFORMER. Reasons why dry-type transformers are safer and less expensive to install and maintain are shown in a 23-page booklet (B-4428) available from Westinghouse Electric Corp., Pittsburgh, Pa. Contains a special section on sealed, submersible, dry-type transformers for installation underground. (87)

LUBRICATION. Covering the full line of Lubriko greases for anti-friction bearings, this folder gives uses and application data for 25 Lubriko densities. Also given are facts on lubrication maintenance and selection of a lubricant. Offered by Master Lubricants Co. (88)

VIBROPAD. You can muffle shock, noise and vibration of heavy equipment with Vibropad. Step-by-step description of installation of the rubber mounting is featured in folder from B.F.Goodrich Co., Akron, O. (89)

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after March 1, 1951, if mailed in U. S. or Canada.

NOT GOOD AFTER MAR. 1, 1951—If mailed in U. S. or Canada December, 1950

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	31	38	45	71	78	85
2	9	16	32	39	46	72	79	86
3	10	17	33	40	47	73	80	87
4	11	18	34	41	48	74	81	88
5	12	19	35	42	49	75	82	89
6	13	20	36	43	50	76	83	90
7	14	21	37	44	51	77	84	91

My Name ..... Position .....

Company .....

Address .....

Equipment Shorts

"PNEOLATOR." Portable automatic breathing apparatus consists of a rubber and plastic facepiece connected to two valves by two 4-ft. lengths of corrugated rubber tubing. One valve administers oxygen at regular intervals under positive pressure. The other lets oxygen flow only when patient inhales. Valves interchange automatically depending on whether or not patient is breathing. Used for victims of drowning, electric shock, poisonous or suffocating gases, heart attacks, asphyxiation. Available: Mine Safety Appliances Co., Pittsburgh, Pa. **(31)**

DRILL STEEL. CA Double Diamond alloy hollow drill steel is recommended by the manufacturer for use with all types of detachable bits. Its hardness in the natural or as rolled condition is higher than the straight carbon Crusca hollow drill steel, thereby giving it greater strength and greater resistance to fatigue. High carbon and alloy content, moreover, give this steel strong resistance to wear and abrasion. Crucible Steel Company of America, New York, N. Y. **(32)**

BIT RECONDITIONING GAGE. Handy gage for use in reconditioning tungsten carbide bits will show you when to grind and the proper angle to grind a dull bit. Rok Bit Sales & Service Co., Philadelphia, Pa. **(33)**

COMPRESSOR. The redesigned 105 Worthington Blue Brute compressor is 10 in. shorter, 4 in. lower and weighs 300 lb. less than previous models. Numerous new features have been added to the model which is powered by either diesel or gasoline engine. Worthington Pump and Machinery Corp., Holyoke, Mass. **(34)**

PROTECTIVE COATINGS. Chlorclad M-4 (for metal and concrete) and Chlorclar W-6 (for wood) offer protection under almost any corrosive conditions. Advantages claimed are excellent adhesion, good hiding power, good hold on wood under varying moisture conditions, unaffected by free alkali in concrete, economical for plant painting because of easy application and long life. Carboline Co., St. Louis, Mo. **(35)**

TRACTOR. Allis-Chalmers' latest torque converter equipped tractor, HD-20, has just been introduced. Properly balanced weight (41,000 lb.), long, wide tracks, and 2-cycle GM 6-110 diesel engine equip the monster for handling tough jobs. Allis-Chalmers Mfg. Co., Milwaukee, Wis. **(36)**

TRAILER. A new big high-speed trailer, the Athey PD-20 is matched and designed for use with the recently announced Caterpillar DW20 diesel tractor. Design is the semi-bathtub type with tapered sides and one low side for easier loading and dumping. Athey Products Corp., Chicago. **(37)**

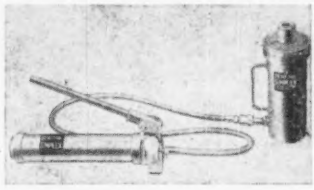
PORTABLE RADIOTELEPHONE. Large size "littlefone" now has 2 full watts power, weighs 14 lb. Self-contained two-way radio station is powered by batteries giving 8 hrs. continuous service between charges which can be made from car battery or 115 v.a.c. Doolittle Radio, Inc., Chicago, Ill. **(41)**

MAGNETIC EQUIPMENT. For your tramp iron problem, here are 3 ATOMagnets, listed as "Extrapower," "Ultrapower," and "Superpower." New features are: riveted construction; continuous hinge for easy installation; cover to prevent accumulation of iron on the backs of castings; insulation confining magnetic strength to working surface; and flush air gap preventing gathering of fine iron to short out magnetic field. Eriez Mfg. Co., Erie, Pa. **(42)**

WIRE ROPE. Two new wire rope constructions have been developed for hoist duty on medium and large sized shovels and draglines. Over a 2-year period, these ropes, 6x43 and 6x49, have undergone severe field tests. Yardage excavated is reported to have averaged 35% more than had been previously recorded on the same equipment under identical conditions, with down time for re-reeving checked at 25% less. John A. Roebling's Sons Co., Trenton, N. J. **(43)**

DRILL STEEL. Tungsten-carbide tipped drill steel comes in lengths from 2 to 20 ft. and in diameters from 1⅝ to 1 15/16 in. with various sized shanks. Rip Bits Ltd., Sheffield, England. **(44)**

DRILL-CLEANER. If plugged drill steel is costing you money, try the Pan-American drill-cleaner. It's fully mechanical, using compressed air at 60 psi. or higher. Saves money in preventing the scrapping of plugged steel that cannot be cleaned by hand. Saves time by using a fraction of the time required to clean steel by hand. Straub Mfg. Co., Oakland, Calif. **(45)**



JACK. Remote control jack operates where limited space or other difficulties make the use of self contained jacks impossible. The unit, tradenamed "Re-Mo-Trol" enables the operator to lift, pull or push in any direction, from a distance. Seven models will range from 10 to 100 tons in capacity. Templeton, Kenly & Co., Chicago, Ill. **(46)**

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NEW BOOKS

MINERAL INDUSTRIES EDUCATION. By Dean Edward Steidle, School of Mineral Industries, Pennsylvania State College, State College, Pa. Published by Mineral Industries Extension, State College, Pa. Pp. 252. Price, $3.

Dean Steidle's philosophy of education as it affects mineral arts and sciences is set forth in this book in three parts: "I. Roots of Human Progress. II. A Philosophy for Conservation. III Wanted: Mineral Industries Colleges."

Purpose of the text is to "aid mineral industries educators everywhere, especially in sister Land-Grant institutions where education in the mineral arts and sciences is a solemn obligation under the terms of the organic Land-Grant Act."

The book is built around Dean Steidle's orientation lecture course for new men in the Mineral Industries School, and is used as a textbook. A search of literature on educational subjects indicates that this is the only book published thus far on the specific subject of mineral industries education.

DE RE METALLICA—Georgius Agricola (Hoover translation). 1950 Edition, Dover Publications, Inc., N. Y. Pp. 638; Price, $10.

This well-known translation of Agricola's famous treatise on mining and metallurgy of the early 16th century is now available again in an attractive, reasonably priced edition. This fascinating work, so conducive to modesty when reviewing the accomplishments of the last 400 years, belongs in the library of every mining man who takes a broad or historical interest in the art to which he is devoted.

THE EFFECTS OF ATOMIC WEAPONS. Prepared for and in cooperation with the U. S. Atomic Energy Commission and the Department of Defense, under the direction of the Los Alamos Scientific Laboratory. Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. Pp. 456. Price, $3.

Here is a factual, authentic account of what happens when an atomic bomb goes off. It is based upon observations made by qualified scientists who have recorded what happened at Bikini, Alamogordo, Nagasaki, and Hiroshima. With this data, the authors of the book have been able to predict the degree and distribution of damage that will result from air blast effects and thermal and other radiation produced by an A-bomb. These effects will vary, depending upon whether an A-bomb goes off under water or in the air. For an air burst, for instance, one table shows that wind velocities due to the blast will be 800 miles per hour at 1,000 ft. from the blast center and diminish to 50 miles per hour at 12,000 ft. Effects of radiation and means of preventing radiation injury are likewise discussed in detail.

The basic purpose of the text is to inform civil defense authorities and trainees what to expect and what to do in event of an atomic explosion. Every civilian should read this book to avoid panic which might result from a lack of knowledge of atomic warfare. You might just as well brush up on your atomic physics now while there is time, and this means knowing what a roentgen is. (It's a unit of intensity of ionizing radiation produced by radioactive particles, x-rays or other sources of alpha and beta particles, and gamma rays.) This book offers a wealth of good basic scientific knowledge pertaining to radioactivity, residual radioactivity (the type that persists long after a bomb goes off), physical effects of radioactivity on the human body, detection and measurement of radioactivity, and the amount of radioactivity that the human body can safely stand (measured in milliroentgens or roentgens per hour or per day).

Chapter headings like the following indicate the scope of the book: Principles of an Atomic Explosion; Shock from Air Burst; Shock from Underwater Burst; Physical Damage from Air Blast, Ground, and Under-Water Shock; Thermal Radiation and Incendiary Effects; Initial Nuclear Radiations; Residual Nuclear Radiations; Measurement of Nuclear Radiation; Decontamination; and Protection of Personnel.

Parts of the book are quite technical, but readers with an engineering or scientific background should not find these sections beyond their ability to assimilate.

Books Received

The Mineral Industries of New York State. An excellent report on the location of mineral producing areas and mineral production statistics. Complete with 22 tables and 14 maps and diagrams. Available free at New York State Department of Commerce, 112 State St., Albany, N. Y. Pp. 108.

Ontario Mining Association. Reports of Directors 1949-1950. The report contains four sections: Part I, which covers Provincial and Dominion laws affecting mining; Part II, which covers the production and outlook for nickel, copper, gold, and iron; Part III, which analyzes the impetus which metal mining provides for Canada's secondary industries; Part IV, which discusses mine safety, electric power, cost of supplies, and the future outlook; Part V, consisting of important mine and production statistics. Available without charge at the Ontario Mining Association, 320 Bay St., Toronto, Ontario, Canada.

Mining Directory of Minnesota 1950. By Henry H. Wade. Published by the University of Minnesota, Minneapolis, Minn. Pp. 253. Contains a complete list of mining properties on the Mesabi, Vermillion, Cuyuna ranges and the Fillmore County district; also detailed township maps of these mining districts. Tables in the directory give iron ore reserves in Minnesota, Michigan, and Wisconsin; shipments of Lake Superior iron ores; average analysis of Lake ores; classification of iron ore shipments; beneficiation plants of the Minnesota Iron Range; ore prices; assessed valuation of iron ore in Minnesota; average production costs; and ore imports and exports.

Canadian Mines Handbook. Published by the Northern Miner Press, Ltd., 122 Richmond Street West, Toronto 1, Canada. This handbook lists a total of 8,893 companies. Of these 803 are carried in the active section, and 8,090 companies remain inactive. In mid-1949, this handbook reveals, not more than 300 companies were active in development or prospecting, and fewer than 75 were diamond drilling or planning it. In mid-1950 the number of companies with work in progress was more than 400 with 155 either drilling or about to start. The number of producing mines has expanded from 133 to 149. Pp. 352. Price $2.

Year Book of the American Bureau of Metal Statistics—1949. Metal statistics for copper, lead, zinc, gold, silver and other commercially important metals. Published by the American Bureau of Metal Statistics, 50 Broadway, New York, N. Y. Pp. 112. Price $3.

The Orange Free State Gold Mines. By Paul Klempner. Prepared particularly to interest investors in this rapidly developing mining area. Published by P. Klempner, Pinners Hall, Austin Friars, London E.C. 2. Pp. 107 plus an excellent map. Price 21s.

Antimony Deposits of El Antimonio District, Sonora, Mexico. U. S. Geological Survey Bulletin 962-B. By Donald E. White and Reinaldo Guiza. Available at U. S. Government Printing Office, Washington 25, D. C. Price 70c. Pp. 31 plus 15 maps.

(Continued on page 158)

CHINESE QUARTER of Kuantan houses the shops and that part of the population which has been attracted to the area by the tin industry but which does not come directly under control of the mining company, Pahang Consolidated.

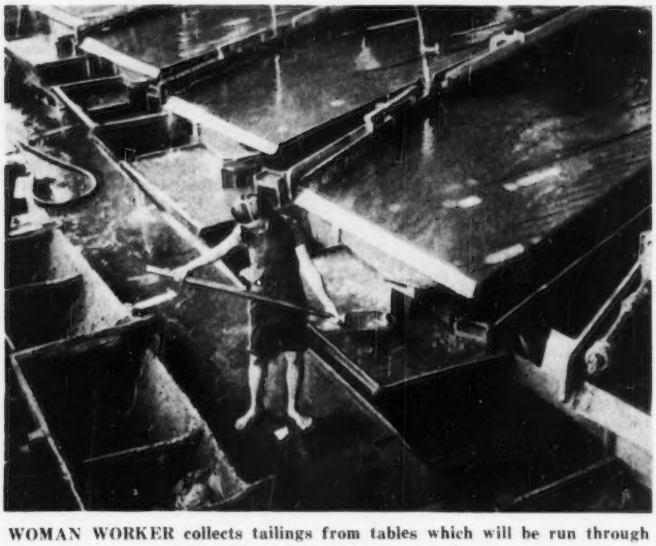
LACK OF MACHINERY has handicapped recovery of Malayan tin mines from prewar scuttling.

Tin Lode Mining in Malaya

ONE OF THE WORLD'S LARGEST lode mines producing tin, belongs to Pahang Consolidated Co., Ltd. (London, England) and is located about 30 miles from the town of Kuantan on the east coast of Malaya. Mining rights, acquired from the Sultan of Pahang for 77 years from 1891, cover about 200 sq. mi. At the end of 1941, in the face of Japanese invasion, operations were suspended, mines flooded and the property evacuated. The company regained possession of the properties in November, 1945, and dewatered the mine. They are now busy reconditioning lower levels along with restoring production.

Extent of this task is more readily visualized when you realize that the shaft is 1,600 ft. deep and that underground workings total approximately 200 miles. About 3,000 people are now employed.

Tin mining in the Federation of Malaya has assumed its pre-war leadership in world production after its tremendous setback in the war years caused by sabotage and incompetent management by the Japanese. With only from 60 to 75% of prewar operations back in production, however, Malaya has not yet reached its pre-war peak output of 84,000 tons of tin. Until now progress was hindered by lack of machinery, political unrest and downright lawlessness on the part of Chinese bandits. At present war once again is threatening to cut off tin supplies from Malaya and the surrounding areas. In the last month the price of tin reached unprecedented heights as supplies dwindled. International conferences to relieve the tin price situation have been uniformly unsuccessful. The outlook for tin is one of tighter and tighter supply.



WOMAN WORKER collects tailings from tables which will be run through the mill again to extract more tin.

IN MINING

IN THE UNITED STATES

- Kennecott Starts New Open Pit—p. 139
- RFC Loan for Copper Cities' New Orebody—p. 129
- Vulcan Project in Idaho Hits Ore—p. 132

ALABAMA

★Sloss-Sheffield Steel & Iron Co., Birmingham, has awarded contract to the Koppers Co. to **construct a new battery of 30 coke ovens** at its Birmingham plant. Cost of the new ovens will be about $2 million.

The company plans a $500,000 research plant of which a $100,000 unit is to be constructed immediately. This is one of the largest expenditures for research by a single industry in the area.

ALASKA

★Rudy Kransi, superintendent of **Myrtle Creek mine**, reported more than 300,000 ft. of bedrock had been sluiced this season. He operated with two D-8 caterpillars and a dragline. Work was stopped in October.

★Gilbert Martin's five-man crew, working the **Fred Campbell prospect** in the Richardson area where water is hoisted 200 ft. for sluicing, was on two 10-hr. shifts, 7 days a week during the fall.

★Tom Carr, Nick Mandich, and John Julius **shut down operations** on Lillian Creek in the Livengood district in October, but plan to sink a few holes during the winter. The Wrede Brothers closed their operations on Deadwood Creek about the same time.

★Work at the **Eureka Creek property** of Earl Francis and Joe Cable was suspended early in October because of the dry season.

★Leroy Mining Co. brought about 3 **tons of gold concentrates** from their 20-ton ball mill and flotation plant to Juneau in September. The property is at Glacier Bay. Another shipment was expected in October or November to be sent to the Tacoma Smelting Co.

★Members of the faculty of the School of Mines are giving the **annual mining short courses** at the University of Alaska. Starting Oct. 23 and ending Dec. 22, sessions run from seven to ten three nights a week. Three main divisions are mineralogy, geology and mining and milling.

ARIZONA

★The mines and smelter of **Magma Copper Co.** at Superior have reported a net profit of $1,146,486 for the first nine months of 1950. This compares with a net loss of $37,061 for the same period last year.

★F. W. O'Brien, Neil Vogel, J. P. Nash and Howard Kuhlman of Austin, Tex., have purchased the **Charleston lead mine** in Cochise County. Charles Sudor has operated the lead-zinc property for the past three years. William Catron, mine superintendent of the Cananea Consolidated Copper Co. in Mexico will be superintendent of the new operation.

★Arizona's supreme court has liberalized its interpretation of qualification claims for **compensation resulting from silicosis.** Rules setting up a required evidence for compensation are:

1. Proof that the victim is suffering from silicosis.
2. That within the past 10 years preceding disability, 1,200 shifts were worked either underground or on the surface of mines in the state.
3. That total disability resulted within two years from the last day the employee actually worked for the employer against whom compensation is sought.
4. That the operation was in quartz or primary quartz formations.
5. That dust from such operations was present in appreciable quantities.

★**Mining employment in the state is on the upswing.** The Employment security Commission of Arizona reports that 13,100 men were working in mining and quarrying in August—an increase of more than 300 from July. The work averages 46.2 hours weekly with average earnings $73.20.

★**Copper Cities Mining Co.**, a wholly-owned subsidiary of Miami Copper Co., recently **completed negotiations for a loan from the R.F.C.** The loan is to be used in developing and bringing to production a copper property of the Copper Cities Mining Co. in the Globe-Miami mining district of Gila County. The present plan contemplates use of the Castle Dome concentrator and mining equipment which will be removed and erected at the new site.

The deposit, comparable in size and grade with the Castle Dome mine, will be developed as an open-pit mine. Preparatory work on the project is scheduled to start immediately. The productive capacity of the new property will be approximately 12,000 tons of ore per day, or 45,000,000 lb. of copper per year.

★Reopening of lead, zinc, gold and silver workings on the Mount Union properties in Yavapai County have been announced by the **Silver King Divide Mining Co.**, an Austin, Nev., organization. Old workings will be mined and the 600-ft. tunnel will be pushed deeper into the ore vein.

★**Three major copper mining companies** in Arizona have granted a 10-c. hourly wage increases to miners, smeltermen, shop workers and trainmen. The trend was started by Phelps Dodge Corp., and was duplicated by the Miami-Inspiration Copper Co. and the Kennecott Copper Corp.

★**Douglas Foundry, Inc.**, a subsidiary of the Seattle Foundry Co., Inc., of Seattle, Wash., will be constructed at Douglas, Ariz., at an investment of more than $300,000. The foundry will manufacture steel grinding balls and steel castings for the Phelps Dodge company smelter at Douglas. Most of the steel castings will be used in the mining operation at Bisbee and the smelter division at Douglas.

ARKANSAS

★**Uranium has been discovered** 10 miles east of Hot Springs by University of Arkansas research parties. The discovery was made in the Potash-Sulphur Springs area, according to an announcement by W. W. Grigorieff, director of the University's Institute of Science and Technology.

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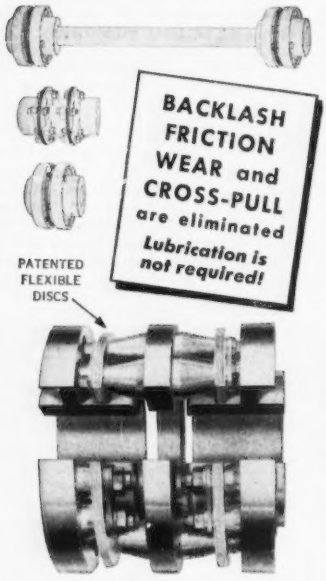

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OPEN-PIT PERLITE operations of Alexander Film Co. near Rosita, Colo., which have been sold, along with other perlite interests, to the newly formed Perlite Mines Co., headed by Curtis P. Ritchie of Pueblo. Perlite Mines has paid a $10,000 deposit toward the $390,000 purchase price, the seller reported.

Arkansas *(Continued)*

★Purchase of the **Big Rock Stone & Material Co., Little Rock,** has been made by Minnesota Mining & Manufacturing Co. of St. Paul, Minn. The concern, sold for an undisclosed sum, includes a stone quarry and crushing plant at Big Rock, a stone quarry on the Arch Street pike, a ready-mix concrete plant and a sand dredging fleet, as well as general offices in Little Rock.

CALIFORNIA

★**Tungsten mining is surging ahead** in Inyo County, demand having been accelerated by stoppage of imports from China and by national rearmament needs. Besides recent development and increased production by U. S. Vanadium Corp. at its Pine Creek scheelite mine near Bishop, rehabilitation of other mines in the region is going forward. Another active tungsten mine in the Bishop region is the Yaney, operated by R. W. Adams and B. W. Van Voorhis. Ore is hauled about 2 mi. to the reduction plant at the Bishop antimony mine. Concentrates are bought by Molybdenum Corp. of America.

★Shasta County is becoming a center for **asbestos mining** in California, with developments underway in the LaMoine area, 45 mi. north of Redding, and at Mears Creek. The Johns-Manville Co. is working on a chrysolite deposit in the LaMoine district, said to contain cross-fiber spinning grade asbestos. At Mears Creek Ray Sylvester is mining amphibole asbestos on property leased from Southern Pacific Land Co.

An asbestos products plant is scheduled for construction in Santa Clara by Keasbey and Mattison Co. of Ambler, Pa.

★Robert Morris, Nevada mine operator, has leased the entire workings of the **Empire Star Gold Mining Co.** at Grass Valley. Present owner of the mine is the Newmont Mining Co., which acquired them in 1929.

★Edwin L. Oliver, president of the **Idaho-Maryland Mines Corp.,** announced recently that the company's production has been lessened by reduction of the workers from 350 to 200 men. Workers have been leaving the gold mines to seek employment in lead and copper mines which are considered more essential industries and offer more security from the draft. This reduction has cut volume from $150,000 to $100,000 monthly.

★The Ancho-Erie Mining Co., **Nevada County's third gold producer,** is continuing development of the Ancho and Erie veins 26 mi. northeast of Nevada City. The Ancho ledge, located in a schist and slate formation with a granite contact, averages about 5 ft. in width and is developed to a depth of 550 ft. The Erie vein was developed from a drift from the main Ancho crosscut tunnel. The ledge is described as a vein of quartz stringers and slate. The 250-ton mill and mine equipment are operated by electricity and an electric locomotive hauls ore underground.

★**The Independence mine,** a lode gold property in Siskiyou County, was bought recently from Buzzard Hill Mines by C. T. Eastman of San Francisco and M. C. Kaval of Riverside and is being operated on a substantial scale.

★**Quartz Hill,** also a lode gold property in Siskiyou County, was bought recently by Harry M. Thomp-

son and Caludio Garabotti for a reported $150,000. It contains a huge white quartz hill credited with containing enough ore to keep the 100-ton-per-day cyanide mill in operation for many years.

★Dredgers and hydraulic methods have been mainly used in the recovery of **$525,490 worth of gold from placer mines in** Siskiyou County last year. The majority of the hydraulic mines are located in the Klamath River and Salmon River areas.

★**Yuba Consolidated Gold Fields** is planning to redredge about 3,500 acres in the Yuba River area. The Yuba No. 3 dredge on the Feather River east of Gridley, Butte County, has been remodeled for the recovery of gold in its natural state.

COLORADO

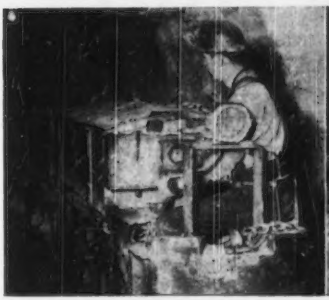
★F. A. Sitton of Dove Creek reports that **uranium ore of "very good grade"** is being shipped from his Arizona lease. Sitton said that 1,100 tons were shipped in July. Eight crews of the Mineral Engineering Co. of Grand Junction, Colo., began diamond drilling recently, for additional uranium ore on the 1,280 acres he leased six months ago in the Lukachukai Mountains.

★A system of leasing is being perfected on the **Conqueror mining property** at Empire in Clear Creek County by Bob Hasty, Colorado mine operator, who has secured a six-year lease and bond on this property of 16 patented claims. The sub-leases being driven cover blocks of the property 300 ft. square and down to 200-ft. depth. The first sublease has been granted to Al Bein and partners of Idaho Springs who will mine two blocks of the ground. They have reconditioned the H&B mill near Empire where the ore will be treated.

★The Cresson and Ajax mines at Cripple Creek **will resume mining operations in December,** according to an announcement made by Charles Carlton, mining manager for the Cresson Consolidated M. & M. Co., the Golden Cycle Corp. and other local mining properties. As the new Carlton mill will be ready to receive ore on the first of January, 1951, these two mines will be opened approximately a month earlier in order that lessees and companies will be able to have ore broken, hoisted and ready for shipment on that date, Carlton stated.

★At Pagosa Springs, Fred White and associates have filed on 20 claims showing **uranium-bearing ore** in the Blanco Basin to the West Fork area. Most of the newly located claims are in Mineral County. The prospectors announce that development work is underway. The claims are among the first that have been reported outside of the Colorado Plateau in Western Colorado.

THEY EVEN SURVIVE WRECKS!



Edison mine haulage batteries have gone through many wrecks with little or no damage and still delivered a full life.

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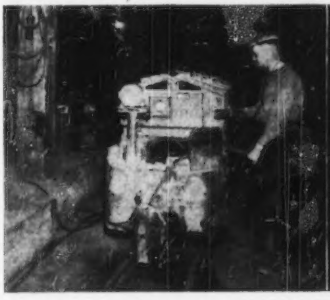
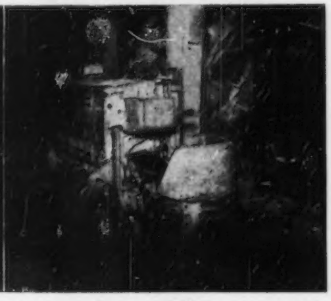


Users know that Edisons are economical and dependable and can be fully charged in 6 to 7 hours direct from d-c lines.



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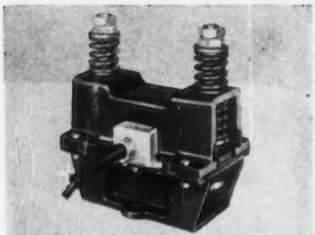
SYNTRON



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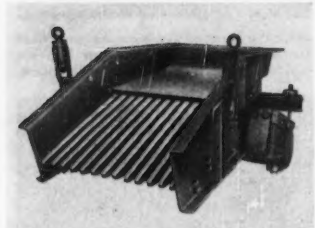

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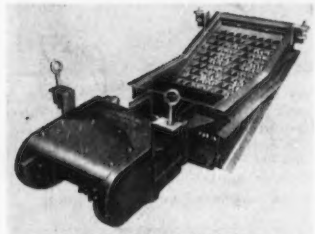

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Colorado *(Continued)*

★**A new discovery of uranium** has been found in South Park about 70 mi. west of Colorado Springs. William H. Gaddis of Hartsel said he had struck ore "with a good uranium content" about 8 mi. north of Hartsel. He went over the property with a Geiger counter last year and later leased 1,200 acres.

★**Park City Cons. Mines Co.** of Utah reports that recent developments at the company's Colorado operation have been favorable. In June, 1949, work was started on the lead-zinc-silver property located at Crested Butte, Gunnison County. To date over 1,000 ft. of the fissure has been opened, the ore assaying from $20 to $60 per ton. An advance of 6 ft. per day is being made at the present time. To prospect the fissure at depth, a churn drilling program of seven holes along the length of the opened part of the fissure has been started. The first hole is now down over 390 ft. and should contact the vein at about 600 ft. Shipments have started to the Resurrection mill at Leadville, Colo. Richard C. Badger, vice president, says he believes a new producer of zinc, lead and silver is being opened.

★Utah Construction Co. is driving the **Leadville drainage tunnel.** It is reported that they are now through one spot of the treacherous ground that caused trouble to previous drillers. A total of $500,000 was made available for the tunnel and the present contract calls for an advance of 3,500 ft. to the first objective to unwater some of the mines of the district. The tunnel was started in December, 1943, and was only driven 6,600 ft. through bad ground before funds were exhausted.

★**San Juan Mining & Developing Co.** of which Charles H. Turner of Montrose is manager, reports that its mining property at Matterhorn, two miles south of Ophir Loop in the Telluride district, is now in operation. The principal vein, which is well mineralized with heavy sulphides, has returned assay values between $23 and $26 per ton, with values in gold, silver and copper. The second vein is a commercial streak of solid galena with silver. This assays well over $50 per ton over a mining width. The work has been supplemented by an electrical conductivity survey, which has indicated a length of more than 1,000 ft. along the copper vein and a length of approximately 550 ft. along the lead vein.

GEORGIA

☆Plans for the construction of a blast furnace at Cedartown, Ga., to process the **brown iron ore of the district** are under consideration by mining interests of the area. At a meeting held Oct. 24 plans were discussed to seek Government aid and have the deposits classified as war material potential because of the manganese content.

The meeting was attended by Captain Garland Peyton, head of the Department of Mines of Georgia; J. R. Thoenen, U. S. Bureau of Mines at University, Ala., N. J. Urquhart of Steel Processing Co., Pittsburgh, Pa., and others.

It was agreed that several factors were required before a pig iron furnace could be established. However, it was pointed out that the ore lends itself to beneficiation and will run ahead of minimum requirements for economic operation of a furnace. It is estimated that the deposits in an area of about 60 square miles contain about 100,000,000 tons of ore and that much more ore is available at depths greater than 30 ft.

The meeting brought out that the Bureau of Mines is working on a process to concentrate manganese. The metal now is a top critical item in national defense.

Mr. Urquhart explained to the group that his company had perfected a process which would make processing of the brown iron ore commercially economical. He said his company is primarily interested in fine ore which can be reclaimed from fines now going to waste from ore washing plants in the area. He gathered samples for tests.

IDAHO

★**American Smelting & Refining Co.** has completed sinking its prospect shaft to the 3,000-ft. level on the Vulcan group in Lake Gulch just west of the city limits in Wallace and has encountered a commercial sized vein of high-grade silver-lead ore in the first short crosscut. The shaft is 4-compartment size and was put down from the 800 to the 3,000-ft. level without stopping to prospect intermediate levels.

The first mineral disclosure in the south crosscut from the bottom of the shaft was a 35-ft. wide zone of hard bluish Revett quartzite, all of which is pretty well mineralized and contains 2-ft. wide streaks which average 6.8 oz. silver, 12.7% lead and 2.5% zinc. On the hanging-wall side of this structure which averages 26.6 oz. silver, 19.9% lead, 1.7% zinc and 3% copper per ton, according to J. E. Berg, general manager of the Federal Mining Co. (controlled by AS&R) who have charge of the work. Other veins are expected further south as the crosscut progresses. Crosscuts north to the west and east of the shaft have encountered a vein structure 2 to 4 ft. wide which assays on the west side 12.7 oz. silver, and 9.8% lead and on the east side of the shaft this same structure assayed 4.2 oz. silver, 9.1% lead and 7.2% zinc per ton. The ore is being trucked to the Federal's Morning mill at Mullan for treatment.

Callahan Zinc-Lead Mining Co. is

the owner of the Vulcan property. AS&R has a 60-year lease on the group. Day Mines, Inc., owns a one-quarter interest with AS&R and is paying one-fourth of the cost of the shaft development. The Day interests will continue the AS&R crosscut further south to prospect the Fern group, located further south in the silver belt.

★Whitedelf Mining Co. at Clark Fork, Idaho, **is installing a new air compressor plant** preparatory to deepening its main working shaft. Two sets of leasers are producing high-grade silver-lead ore from the upper workings.

★Silver Bowl Mining Co. is milling **5,000 tons of stockpiled silver-lead-zinc ore** at the Amy-Matchless mill on Pine Creek which was recently converted into a custom milling plant.

★Employees of the Star mine at Mullan, owned by the **Sullivan Mining Co.** (subsidiary of Bunker Hill and Hecla) voted on Oct. 7 to remain independent of the International Union of Mine, Mill & Smelter Workers. Out of 500 voting 121 were in favor of the union and 277 against. This is the only mine in the Coeur d'Alene district not under control of the union and this is the third time in recent years that affiliation has been turned down.

On Nov. 1 the Star mine increased its employees' wages 10c. an hour, bringing the pay of miners to $12.45 per day, the highest wage rate ever recorded in the Coeur d'Alenes. The mine operates on a six-day week, therefore a full-time miner earns $74.70 per week or $298.80 for a 4-week month. The raise also applies to Hecla, Polaris and Silver Summit mines as well as the Star, according to L. E. Hanley, president and general manager of the group.

★C. Girard Davidson, Assistant Secretary of the Interior, addressed a meeting of more than 100 mining men at a banquet in Wallace Oct. 23 and stated that every effort will be made to **prevent the drafting of miners** into the armed services. Davidson said:

"We have asked the director of selective service not to take men out of the mines, and I believe local draft boards have been so instructed."

★**Sunset Minerals Mining Co.**, Inc., will deepen its Liberal King shaft from the 1,200-ft. level, according to Bliss Moore, general manager. The company plans to sink a winze on the orebody, crosscut and raise to a connection with the main operating shaft. The company is producing about 1,000 tons of ore per day that averages 12 to 14% combined lead and zinc.

★**Silver Syndicate's orebody** on the new 3,850-ft. level has proven to be 8 ft. wide with an average value of 23% lead and 30 oz. silver per ton, according to Norman Smith, directing engineer. The company is producing at the rate of 4,500 tons of ore per month from stopes above the 3,850-ft. level. Operations are through the Sunshine mine, which company owns

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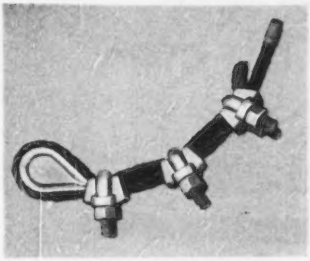

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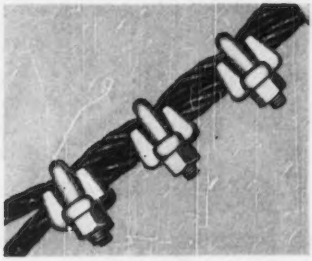

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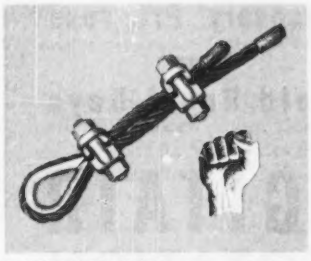

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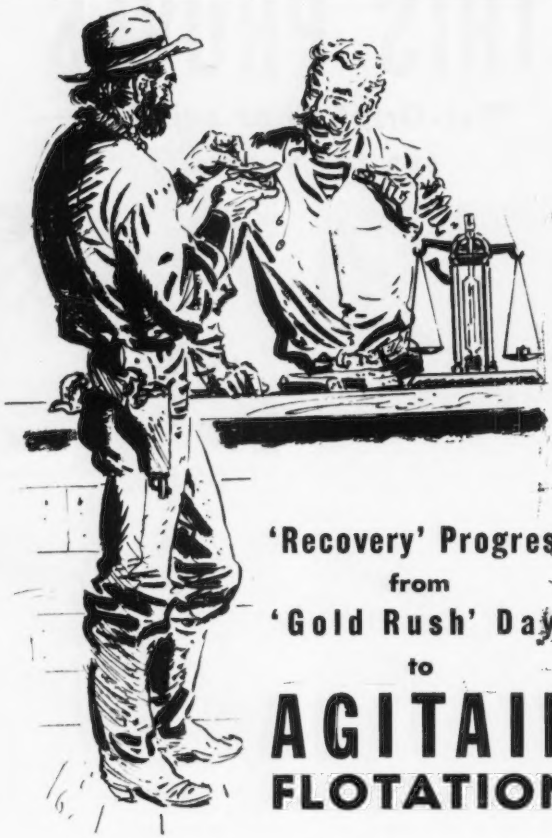

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Idaho *(Continued)*

a one-half interest in the Silver Syndicate.

Lucky Friday Silver-Lead Mining Co. has developed a vein of silver-lead ore on the 1,800-ft. level. Where crosscut, the vein shows 4½ ft. of high-grade ore and an easterly drift on the vein has widened the showing to 8 ft. of ore averaging 67 oz. silver and 44% lead per ton. The company is now shipping 5,000 tons of stockpiled ore that has accumulated in the last three months.

★**Merger Mines Corp.** has been awarded a United States mineral patent on a group of nine mining claims in the Silver Belt between Wallace and Kellogg. **Coeur d'Alene Mines Corp.** prospected a portion of Merger ground on the 2,800-ft. level but was unsuccessful in finding pay ore. Silver Summit Mining Co. has a 50-50 profit sharing agreement with Merger and will prospect the ground through Silver Summit's 3,000-ft. shaft.

★Sunshine Mining Co. has started a new stope on the **Yankee Girl vein** system in the Metropolitan area and will prospect the vein system on higher levels above the 3100. This development is due largely to the discovery of high-grade silver-copper ore on the 2,800-ft. level by Silver Dollar in Purim ground, about 3,000 ft. east on the strike of the Yankee Girl vein structure.

IRON COUNTRY

★Mesaba Construction Co.'s contract for stripping at the **Miller-Mohawk mine** at Aurora (Pickands, Mather & Co.) has been completed.

★Wheeling Steel Corp.'s **Wacoutah mine**, at Mountain Iron, has its new screening, crushing and washing plant in operation to handle the lower grade ores now being mined. The plant has a capacity of 100 tons per hr.

★**Junior Mining Co.** is churn drilling near Longyear Lake, Chisholm, under a state permit issued to D. D. Haley, of Hibbings, who assigned it to the company named. A. B. Tomasich, Virginia, has two churn drills doing the work.

★A contract for stripping at the **Pilot Annex mine** near Mountain Iron has been awarded by W. S. Moore Co. to S. Chanak & Son, of Hibbing.

★Another "exhausted" iron mine is showing signs of renewed life. The W. S. Moore Co. is dewatering the **Knox mine** on the eastern Mesabi. The Knox adjoins Oliver Iron Mining Co.'s Iron Range Reserve No. 88 and Moore has a contract to strip and mine ore for Oliver in conjunction with its operations at the Knox. The last shipment from the property was in 1918 when it was operated by the Graham Iron Co. Since it was opened by the New York State Steel Co. in 1909

354,166 tons of ore have been shipped.

★A new schedule of **Great Lakes ore boat rates on iron ore** went into effect early in October. From Duluth and Superior to lower lake ports the freight is now $1.25; from Marquette, $1.21 and from Escanaba to Lake Erie ports, $1.01; while to lower Lake Michigan ports it is $.83.

★**M. A. Hanna Co.** employees in the Hibbing district voted in favor of a union shop in their contract by 1,029 to 79 out of 1,278 who were eligible to vote.

★On Saturday, Oct. 14 **Oliver Iron Mining Co.** set off a blast in the Hull-Rust pit at Hibbing which was probably a record on the iron ranges. A "rock island" 40 to 50 ft. high, which had been developing since 1937 as the ore around it was removed, was shattered. More than a carload of powder (161,880 lb.) was used in 189 9-in. holes, with a total length of 9,129 ft. The drilling took four months. An estimated 171,157 cu. yd. of rock was broken. Its removal will release the ore lying below it.

★Dr. George W. Schwartz, director of the Minnesota geological survey and professor of geology at the University of Minnesota, has reported that aeromagnetic maps released by the U. S. Geological Survey **indicate a promising area of exploration** on the Vermillion range. The survey discloses a possible extension of the range to the south-east from Tower-Soudan toward Embarrass and Bear Head Lake over a 20-sq. mi. section. There are no records of previous exploration in this area and Dr. Schwartz believes a rather extensive drilling program there is justified. This aeromagnetic survey has been in progress since 1947 over a 30,000-sq. mi. area of northern Minnesota. Maps have been completed of about 25,000 sq. mi. of this total. The survey shows that the aeromagnetic readings near Babbitt are about three times the intensity of those found around Hibbing, the taconite on the eastern end of the range being largely magnetic.

★Inter-State Iron Co. has contracted with **Pacific Isle Mining Co.** to mine for them the north half of the Missabe Mountain mine at Virginia. Since this property adjoins Inter-State's Columbia mine and the property line slope ore on the Missabe Mountain side is high and steep, this arrangement is mutually advantageous, in that it gives the Columbia more room in which to operate and solves a difficult mining problem for the Pacific Isle Co.

★Inter-State Iron Co. is sharing to the extent of **$4,475 in a "safetv savings" fund**, amounting to $69.050, which its parent corporation, the Jones & Laughlin Steel Corp., is distributing to its 26 divisions and subsidiaries. This money is to be turned over to welfare and hospital activities.

★Two new screening plants are being

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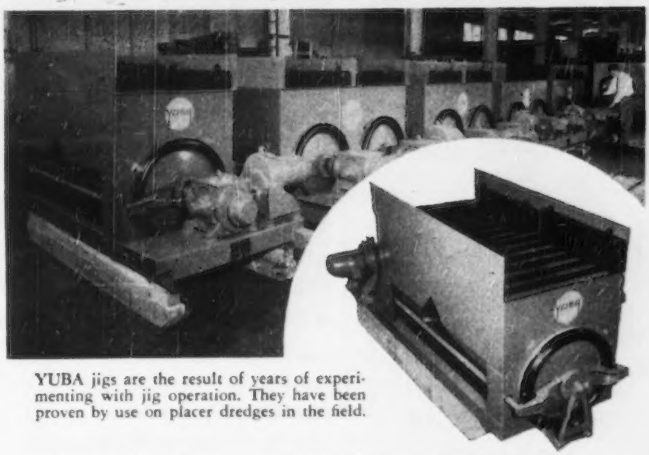

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NEW EXTENSION of Kennecott Copper Corp.'s Ruth Pit (Nevada) shows top, center.

Iron Country *(Continued)*

built at the **Inter-State's Hill-Annex mine**, Calumet, Minn. One is to handle ore from the north extension area being stripped. The ore when screened will be conveyed to the main belt from the pit. The second plant is north and east of the present loading pocket and will screen ore from the Sullivan mine stockpile and from the old Hill-Annex lean ore piles. They contain material which could not be treated prior to the installation of the heavy medium plant this season. The mine's concentrator completed its season's work Oct. 28 and closed down to winter repairs and plant changes.

★The Longyear mine, at Hibbing, is well into its third year **without a lost-time accident.** Two years were completed Aug. 16.

★More than **3½ million cubic yards of stripping** has been removed from M. A. Hanna's Morton mine at Hibbing by the big dragline, which was formerly at the South Agnew.

★John Linden, superintendent of the **Grant mine** at Buhl, has a full program for winter. It includes construction of a plant to treat the tailings pond material for storing.

★Shipments in 1950 from **Steep Rock Iron Mines** passed the million-ton mark Oct. 13, 30,000 tons head of 1949 shipments on that date.

★Through Oct. 28 **Great Lakes ore shipments totaled 69,720,899 tons,** compared to 68,273,990 tons on the same date in 1949, passing last year's figures for the first time this season.

★Beginning Nov. 1 ore freighters were ordered to carry lighter cargoes for the rest of the season and winter insurance rates went into effect. October was a mild month and washing plants were able to operate without interruption by freezing weather, which does not often happen. A late closing of shipping is hoped for.

★Western-Knapp Engineering Co. is designing a plant for the **Jones & Laughlin's Tracy mine** at Negaunee on the Marquette range. The mine is expected to ship a million tons per year.

★**North Range Mining Co.** has finished diamond drilling an iron ore property near Hematite, Ont.

★Employees at the **Book and Blueberry mines** of North Range Mining Co. have voted 194 to 27 in favor of a union shop.

★**M. A. Hanna employees** in the Iron River area, Michigan, at a balloting conducted by the National Labor Relations Board, voted to authorize the United Steel Workers to negotiate with management on the union shop clause in their contract. The vote was 600 to 44 out of 735 eligible.

★**Inland Steel Co.** has taken an option to explore 80 acres of land east of Crystal Falls on the Menominee range. The land is owned by Detroit Mackinac & Marquette Land Co.

★**An unusual mishap at M. A. Hanna's Hiawatha No. 1 shaft,** on the Menominee Range was explained by officials as follows: While sand and gravel for filling stopes was being lowered from the old 9th level stopes to those on the old 10th level, some of the material got out of control and ran into the hoisting shaft. It found its way to the bottom and filled the skip hole to the 18th level elevation. While the material was falling down the shaft, it caught a descending skip and thereby forced the hoist to so speed up and over-run that the ascend-

ing skip ran into the headframe. Headframe and skip were both damaged. No one was injured. Hoisting from the property was handled from the adjoining No. 2 shaft.

★180 cars of ore from **Cleveland-Cliffs Iron Co.'s** Spies mine at Mineral Hills have been shipped by rail to furnaces near Chicago.

★A number of houses on or near the site of **Jones & Laughlin's Tracy mine**, in Negaunee, as well as tracks of three railroads must be moved. They are either over the orebody or else too close to be safe when caving underground begins.

MICHIGAN

★William Stouffer, from Alaska, and Pursel F. Pepper, of Grand Rapids, Mich., are **prospecting in northern Michigan for uranium ore.** The venture is unique in that it is financed in an unusual way. Stouffer works in a beverage plant and is so enthusiastic about the prospects (in preparation for which he has given 2½ years of reading and talking about uranium) that his fellow employees bought "stock" in the enterprise at $9 per share and his boss loaned a truck for the trip. Stouffer is confident that, if uranium ore is there, he will find it. The two men are familiar with northern Michigan because of several hunting trips there.

★Calumet & Hecla Consolidated is conducting **two exploratory operations**, one on Ontonagon County and one in Keweenaw County.

★In Ontonagon, the **Caledonia Adit**, about 2½ miles from Mass City, is being reopened. About 300 tons of vein rock will be broken to test the copper content to procure an accurate estimate of the grade available in the area. Some of the ore will be tested by the Heavy-Media process. A mill test run also will be made. Only the rock containing mineral will be sent to the mill.

★The Caledonia Adit was purchased by Calumet & Hecla in 1937. A 2,000-ft. drift was driven in the Knowlton vein. Present operations are being conducted in that drift. The project is under H. S. Donald, Chief Engineer. Preliminary testing is being done by the Metallurgical Department of the Michigan College of Mining and Technology.

★In Keweenaw County, Calumet & Hecla is doing some trenching in the Phoenix area to disclose outcrops if possible.

★A veritable Niagara of water was encountered recently in **Calumet & Hecla's zinc mine** at Shullsburg, Wis. The pumps were unable to cope with the extra flow of between 7,000 and 8,000 gpm. in addition to the regular rate of about 4,500 gpm. The water was struck in a crosscut that was being driven into the Consler orebody.

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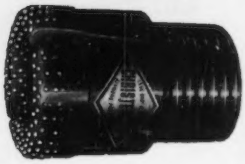

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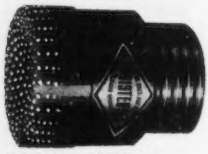

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Michigan (*Continued*)

A 10-ft. aluminum rowboat was pressed into service underground to get the pumpmen to their station. This was the third time in the mines' history that a rowboat was used for transport underground. In spite of delays caused by excessive water, the mine is approaching the break-even point, according to the officials.

★From the profits of its only operation, that of reclaiming copper from waste copper sands at the reclamation plant at Mason, the **Quincy Mining Co.** will pay a dividend of 15 cents per share on Dec. 1 to stockholders of record Nov. 3. The last dividend was 25 cents in March. It is estimated that Quincy has five to six more years of operation on its tailings deposit. Eventually, it is believed Quincy will return to the mining field, when its finances warrant. It has mineral lands which have prospects of yielding good copper returns.

MONTANA

★**Commonwealth Lead Mining Co.,** operating in Madison County, has opened a new orebody in virgin territory between the Calvin and Jack Rabbit mines, according to J. F. Featherstone, general manager. Shipments of high-grade lead and silver ore are going forward from the new strike. The general offices of the company are in Salt Lake City, and it also operates in Utah and Wyoming.

★**Domestic Manganese & Development Co.,** operating a custom concentrator in Butte, has received a 4-year Government contract for the production and processing of manganese ores from the Butte and Philipsburg districts for the nation's stockpile, according to Sen. James E. Murray (D-Mont.). John H. Cole, Butte, is president of the company and the new operations will employ about 100 men at the Butte mill, in addition to the men employed in new manganese mining operations to supply the ore.

★North Butte Mining Co., Butte, **will shortly resume operations,** after being shut down since premium prices were eliminated in August, 1947, according to semi-confirmed reports in Butte. It is planned to lease the copper ore in the property, rather than to mine it, and to erect a precipitating plant to handle the copper-laden mine water. The company also expects to open some of its zinc properties heretofore unmined.

★Carl C. Martin, Whitehall; A. B. Martin, Butte, and Winston Bros. Co., Minneapolis, have donated a complete pilot mill formerly used at the Golden Sunlight mine near Whitehall, Jefferson County, to the Montana School of Mines. The mill is of 15-ton daily capacity, valued at $40,000, and will give the school one of the most com-

plete and up-to-date testing laboratories in the country.

★**Madison County Mining Association,** a chapter of the Mining Association of Montana, held its 13th annual business session and dinner at Virginia City, Oct. 27, Richard O. Dale, Twin Bridges, presiding. John T. Mullaney, Butte, mining attorney, and Richard R. Matthew, county surveyor of Virginia City, gave talks on mining and patent laws and land survey methods, followed by a question and answer session. E. W. Stevens, Boaz mine, was elected president for the ensuing year.

★**Anaconda Copper Mining Co. granted a wage increase of 10c. an hour** to its employees at Butte, Great Falls and Anaconda, effective Oct. 18, although the present contract does not call for reopening the wage question until June 30, 1951. With the recent increase, the basic miners' wages in Butte are now $12.31 per shift.

NEVADA

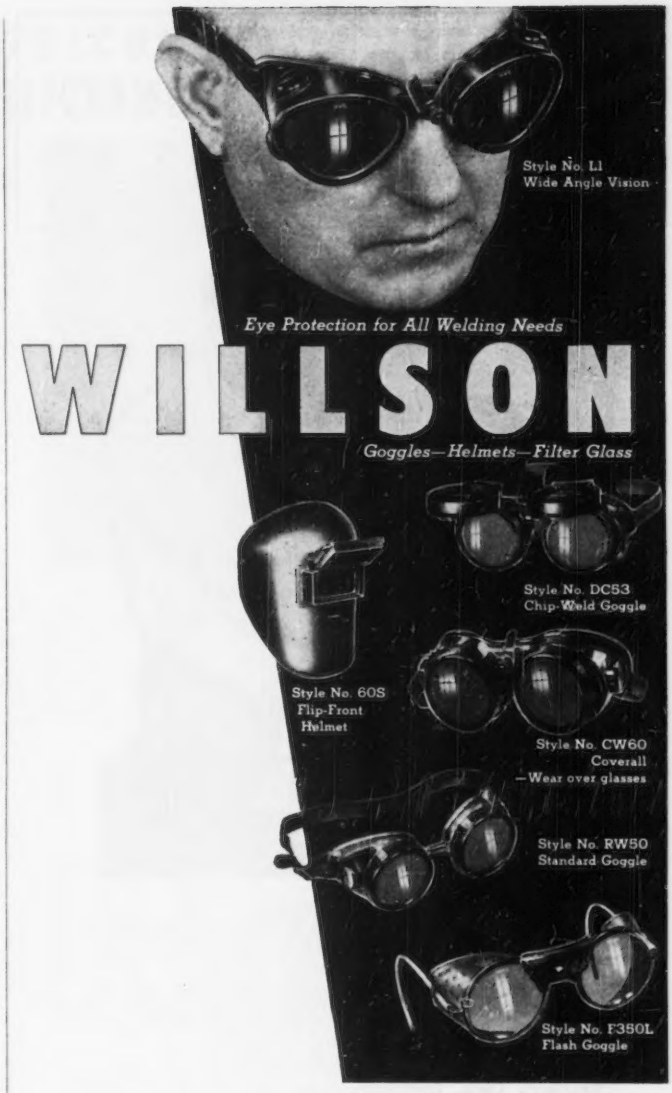
★Kennecott Copper Corp. and the Isbell Construction Co. have completed plans for **development of a new pit** in Ingersoll Canyon between Lake City and Ruth. Work was scheduled to begin about Nov. 1, and operations will be in full swing by early spring. Engineers estimate it will require about two years of development work before the actual orebodies are reached, after which they estimate that more than 3,000,000 tons of ore will be removed. The property will be known as the Kimley pit. Frank Quilici, engineer in charge of developing the new Morris pit at Kimberly, will also be in charge of the Kimley pit for the Isbell Co. The two jobs will be carried on simultaneously, and big equipment will be moved from one pit to the other as necessary.

★**Silver King Divide Mining Co.,** which has been operating the Thomas W. mine near Austin, has notified lease owners that the lease and bond would be surrendered immediately. Work has been suspended except for cleaning up.

★**First carload of manganese ore** from the Reuckl-Raring leases in Pollard Canyon was shipped in October to Geneva Steel in Utah. Regular shipments will be made to Geneva and to the U. S. government for stockpiling. Three men are employed on the open-pit property under direction of W. J. Hoskings, former superintendent of the Getchell Mines.

★Transfer of the **Blackhawk manganese mining claim** in Humboldt County has been announced. Mrs. Mary L. Clough, of Winnemucca, is reported to have made the sale for $18,000 to Charleston Hill National Mines, of which she is the president.

★Active mining operations have been started at **Grey Eagle mine** near Beowawe in northern Lander County.



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Nevada *(Continued)*

A large tonnage of dump material mined by former operators is being trucked to Tenabo mill for treatment, and tunnel development work is being started to reach orebodies exposed and mine previous operations.

★Newmont Mining Corp. is driving a **long crosscut tunnel** below the old workings at its property in the old camp of Candelaria in Mineral County. The tunnel, which has now reached a depth of more than 800 ft., is expected to provide a favorable underground position for an extensive diamond drilling campaign. Fred Searles, Jr., president of the Newmont Corp., said a final depth of 1,000 ft. is planned for the present tunnel operation.

★**A 92-ton shipment of gold ore** averaging $102.50 per ton in value was made during October from the Hill Florence lease in Esmeralda County near Goldfield. The property is being operated by the Red Hill Co. on agreement with Deep Mines Co., whereby Red Hill furnishes the manpower while Deep Mines furnishes the equipment and assumes maintenance and most of the costs. Proceeds are divided on a 50-50 basis. Billy Frank, head of the Red Hill organization, reports a continuing break of gold ore with a very good value.

★Bill Parsons, well known Humboldt County prospector, has reported discovery of a good deposit of manganese in Pershing County. He says the find covers an area about ten mi. across and that the ore assays 55%.

★Contract for construction of a road to the Prince mine in Lincoln County has been let to Foster & McHarg, of Riverside, Calif., for $89,390, according to an announcement by W. T. Holcomb, Nevada state highway engineer.

★A deposit of **low-grade uranium** has been discovered in southern Lyon County by Warren Lose and Lynn Kerlee, of Chico, Calif. Geologists of the Atomic Energy Commission have reported that the samples sent them contain pitchblende.

★Core drilling has been started at the **Summit Queen Mining Co.** silver-gold claims in the Sand Springs field 30 mi. east of Fallon.

★Plans to resume operations at the property of **Buffalo Valley Mines, Inc.**, 35 mi. south of Battle Mountain, have been announced. Assays of ores are said to indicate that profitable operations can be carried on while development of ore progresses underground.

NEW MEXICO

★**Hurlow Mining Co.** is operating one shift at its mine in the Hansonsberg district. Pending completion of the mill, the company is producing some clean lead sulphide jig concentrate for

shipment to the El Paso smelter works and stockpiling a middling product.

★The Portales Milling Co. is **producing lead concentrate** in its newly expanded jig mill at San Antonio.

★The Mex-Tex Mining Co. is **erecting a jig mill** at the site of its barite grinding plant south of San Antonio to produce a finished lead concentrate and barite.

★**Southwest Potash Corp.** has signed a contract with Winston Brothers Construction Co., Minneapolis, to sink the first shaft for its mine in the Carlsbad district. This will be the fifth company in potash production in the district.

★Duval Sulphur and Potash Co. is sinking a shaft and erecting a refinery in the **Carlsbad district** at an announced cost of $7,500,000.

★The Harding mine in northern New Mexico has produced 250 tons of beryllium ore during the past year.

★Kennecott Copper Corp., Santa Rita, has announced a **voluntary wage hike of 10c. per hour** to 1,900 employees, bringing these workers' base pay to slightly more than $72 per week. Phelps Dodge Corp., operating in the same area, had previously granted workers a similar increase.

NORTH CAROLINA

★**Atoz Corp. of Greenville, N. C., has obtained a certificate of incorporation** from the North Carolina secretary of state to acquire lands containing gold, silver, etc. The firm has authorized capital stock of $100,000.

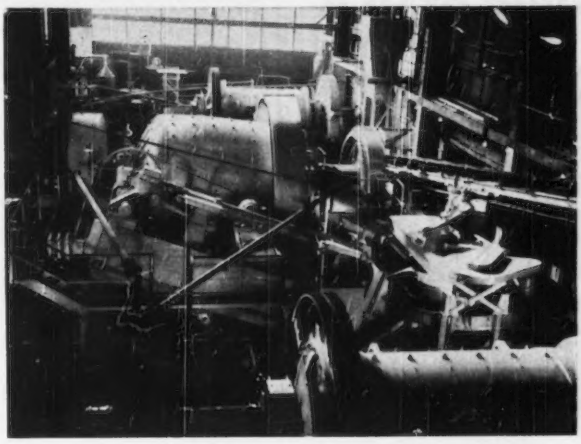
★**Rare Minerals Corp.** of Hayesville, N. C., has obtained a certificate of incorporation from the North Carolina secretary of state to mine and deal in mineral with authorized capital stock of $100,000.

OREGON

★Continental Chemical Co. is **producing manganese from ore mined in Nevada and northern California.** The company's plant at Salem, built during the war to experiment in production of alumina from clay, has been equipped with installations for manganese production by a new process, the details of which are not disclosed. The product is shipped directly to manufacturing plants which have contracts with the procurement division of the United States Signal Corps, which uses manganese in batteries.

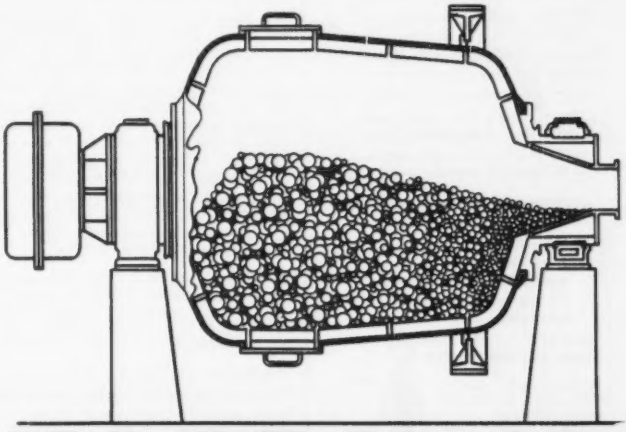
★**The Hanna Development Co.**, subsidiary of the M. A. Hanna Co., has leased the Oregon Nickel Mining Co. property on Nickel Mountain in Douglas County. Development work will depend on results of research on the metallurgy of the ore. This deposit was explored about eight years ago by the Freeport Sulphur Co., which

TRICONE MILL INCREASES MILLING EFFICIENCY 22.6%



Overall view of milling section in a copper mining company, showing an 11-3-6-10 Hardinge Tricone Mill. This mill replaced two 5' x 12' and one 6' x 12' cylindrical ball mills with a net gain of 22.6% in mill efficiency (tons of minus 200 mesh produced per K.W.H.)

Alignment of grinding media is shown in diagram below. Hardinge Tricone Mill features include correct ball segregation, greatest useful working volume, no "dead corners," less exposed liner surface, less floor space, less weight, lower power requirements. Write for Bulletin AH-414-1.



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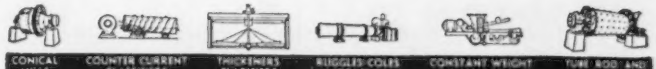

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Oregon *(Continued)*

developed, through diamond drilling, a large tonnage of low-grade nickel silicate ore.

★A report by the Oregon State Department of Geology and Mineral Industries reveals that 1949 **pumice production** in Oregon amounted to a record total of 169,036 cu. yd. of aggregate and 76 tons of abrasive-grade lump material. Under the aggregate classification is included block and ready-mix aggregate, plaster sand, and a small amount of unprocessed pit run pumice. Value of the aggregate products is estimated at about $278,000. Producers included Cascade Pumice Co., Central Oregon Pumice Co., Pumice Engineering Co., Volcanic Materials Co., Chrystallite Aggregate Co., Deschutes Concrete Products Co., and Harney Concrete Tile Co.

★**Lady of the Lake lead-silver-copper-tungsten mine,** at Conconully, has started development by driving a tunnel to cut a surface showing at a depth of 700 ft.

★Lander's quarry, 10 miles east of Roseburg, **is being worked under contract.** The limestone is to be used as agricultural stone.

★Veins in the **Buffalo gold mine** in Grant County are to be intersected by an adit tunnel at 650-ft. depth. High-grade ore will be sorted and the low-grade put through a flotation plant.

TENNESSEE

★**Reynolds Metals Co.** Building Products section, Louisville, Ky., has opened a district office in Memphis, Tenn., to serve western Tennessee, Arkansas, Louisiana, Mississippi and Alabama. Vert Vowell, district manager, will be in charge.

★**The Swiss Aluminum Co.** of Lausanne, Switzerland, located in Jackson, Tenn., will soon be producing aluminum foil at the rate of 100 tons per month. Construction of a new 35-acre plant was completed and operation begun the end of September.

★At a recent safety awards rally, it was reported that **Tennessee Copper Co.'s Boyd mine** has brought out 1,250,000 tons of ore in 1 million man-hours of work without a lost-time accident in the past 2½ years.

★K. M. Sieg, manager of the Chattanooga plant of **American Cyanamid Co.,** has reported that the plant is being completely reconditioned and plans for substantial expansion are being made.

★Aluminum Company of America, Alcoa, Tenn., has announced Sept. 21, that it had volunteered a **general wage increase of 10%** on present basic wage rates for all hourly employees, together with appropriate increases for salaried workers. The wage increase was granted although the wage reopening dates of the agreements with various unions have not been reached. However, the wage increase is effective as of Oct. 1.

TRI-STATE

★Mission Farm Mines, operated by the **Turkey Creek Mining Co.,** have milled about 280 tons of ore at the Federal mill, Duenweg, Missouri. They recovered about 10% zinc and lead ores, the zinc ore assaying about

60% zinc and the lead ore about 80% lead.

★George Potter and Dewey Sims, two independent operators of the Tri-State district, **have developed a large strip mine** on the Snapp tract formerly owned and operated by the Federal Mining & Smelting Co.

Drilling revealed lead and zinc ore extending from 25 ft. below surface to 126 ft. The 25-ft. overburden has been removed from an area about 500 ft. in diameter at the top and 50 ft. deep. Ore is broken down by bulldozers and shoveled in to dump trucks.

★**The St. Regis mine** is being reopened by a new company. The lease consists of 40 acres of ground. The shaft is down to the former level, 211 ft. and is in ore. A ½-yd. Insley shovel has been put in. This is the largest shovel ever used in the ground in this district. The company just bought two Koehin 10-ton dumpsters, and have increased the cable travel up the shaft to 1,800 ft. per minute. This mine is in sheet ground which is low in zinc content and so has to be handled in large tonnages. The ore will be milled by the Duenweg mill of the Federal Mining & Smelting Co.

UTAH

★**New Park Mining Co.** has obtained voting control of the East Utah Mining Co. which has adjacent Park City properties. Voting control was placed at 34.7% of East Utah's outstanding stock, obtained through exchange of 52,773 shares of New Park stock for 1,055,491 shares of East Utah. Recipients of the New Park stock were Newmont Mining Corp., Olin Industries and F. Eberstadt, Inc., which formerly controlled East Utah.

★The travel time pay problem, center of a long-standing dispute at **Kennecott Copper Corp.'s big Bingham Canyon mine** has been settled amicably, according to joint announcement by mine and union officials. Under the agreement, effective Oct. 16 and continuing until June 30, 1952, more than 1,000 of the 1,700 open-pit employees will receive 20 min. of extra pay per shift at time-and-a-half rates. These are men who must arrive at their post at specified operating times. The balance of the men will travel to their jobs on company time, after punching in at various gates.

Unions involved are the Operating Engineers, Brotherhood of Electrical Workers, International Association of Machinists and the International Union of Mine, Mill and Smelter Workers.

★Rapid expansion of the Atomic Energy Commission's **exploration program** in the Marysvale field has been reported by Emerson C. Willey, consultant for the AEC and the U. S. Geological Survey in Salt Lake City. The commission is reported to plan careful study of a 4-mi. area fanning

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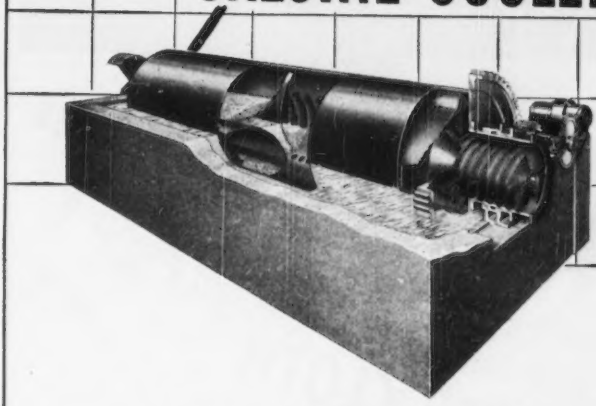

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Utah *(Continued)*

out from the Bullion Monarch Mining Co. and Vanadium Corporation of America diggings in the present center of the district. Such surveys will include diamond drilling, and may likewise feature trenching bulldozing, aerial studies and radiometric surveys. Two AEC diamond drilling rigs now at work in the district may soon be augmented.

Firms and lessees being contacted for agreements permitting exploration include VCA, Bullion Monarch, Plumbic Mines Co., Magnolia Lead and Oil Co., Montgomery-Frasee, Howell Mining Co., Western Uranium Corp. and Chief Consolidated Mining Co.

★**Silver King Coalition Mines Co.** at Park City, which resumed operations Sept. 16 after a 14-month shutdown, has reported a net profit of $2,153 in the last half of September. However, company reports noted a net loss for the year ending Sept. 30, including shutdown expenses, of $251,486.

WASHINGTON

★**Pacific Northwest Alloys** and **Electro Metallurgical Co.** have been invited by the National Munitions Board to bid on a contract for full-scale operations of the Mead magnesium plant.

★Directors of Grandview Mines, operated by **American Zinc, Lead & Smelting Co.** of St. Louis on a 50-50 profit-sharing basis, declared a dividend of 1c. a share to be paid Dec. 5. This makes three dividends totaling 4c. a share to be paid this year, president Karl W. Jasper said.

★**Columbia Lead & Zinc Mining Co.**, operating 20 claims just south of Z Canyon in the Metaline district, has recently exposed 30 to 40 ft. of zinc ore by drifting. In addition a raise of 15 ft. has been chiefly in lead ore, according to Everett Houghland, consulting engineer. Ore taken out in development is being stockpiled.

★Joseph W. Geisbauer and James W. Lower, who leased the Turk and Toga mines, near Fruitland, two years ago, started operation of their **50-ton copper flotation mill** in October. The men claim a recovery now of 97.6%. Heads from the Turk dump, used in testing the mill, have run 3½% copper. They report concentrates running 27% copper. The initial shipment was to go to the Tacoma smelter the first part of November. During the winter mining and milling ore from the Toga will be alternated. In the spring an estimated 10,000 tons from the Turk dump will be milled.

Most of the lead-zinc mines in Stevens County which were closed have been reopened this season and some are producing more than in previous years. Goldfield Consolidated Mines, Inc., is operating its 300-ton Sierra zinc mill at near capacity. The ore is

coming from the open-pit Anderson mine where a four-year supply is said to be blocked out. The company is mining about 120 tons of development ore a day at its Deep Creek mine which was opened in August.

The Bonanza lead mine, which employs 65 men at the mine and mill, has stepped up mill capacity from 90 to 110 tons of ore a day with expectation of doubling capacity when new mill machinery is installed. Mill heads average from 22 to 24% lead and 4 oz. silver to the ton. A crew of nine is working the Old Dominion where over 1,100 ft. of underground work has been done in the past year.

The Admiral mine was reopened in May after a nine-month shutdown and about 20 tons of zinc-lead ore is being treated daily. Mill heads average 20% combined metal. New orebodies are reported to have been found by geophysical surveys at the Gladstone and Electric Point mines.

Young America Mines, a Seattle company, started a diamond drilling program in September at the Young America mine.

The first shipment of 200 tons of lead-zinc ore to Young America mill was made from the Farmer mine this fall.

★At the **Northwest Mining Association's** 56th annual convention, meeting in Spokane Dec. 1 and 2, problems of the mining industry such as labor, taxes, public relations, outlook on silver legislation, and shortages of supplies, shipping facilities and equipment and machinery were to be main topics of discussion.

★Bonneville Power Administration and the Research Division of Washington State College, Pullman, are cooperating in a project to **develop methods of extracting manganese from Northwest ores.** The BPA is reported to be putting $3,000 into the research.

★**Helicolicon Mines, Inc.** has filed two lawsuits asking a total of $1,012,977.44 from the First National Bank of Fairbanks, Alaska.

Robert A. Armstrong, Helicolicon, alleged the bank was holding $12,-977.74 in company funds when it refused to cover company checks. One lawsuit is in that amount. Another is for $1 million in damage to the company's reputation and credit and the shutting down of operations 30 days ahead of schedule when its employees left the job.

More than 200 metal firms will show their new products and latest developments at the Seventh Western Metal Exposition to be held for 5 days—March 19 through 23, 1951—in Oakland's vast Auditorium and Exposition Hall. About 100 speakers will talk on making, working, fabricating, treating and application of metals.

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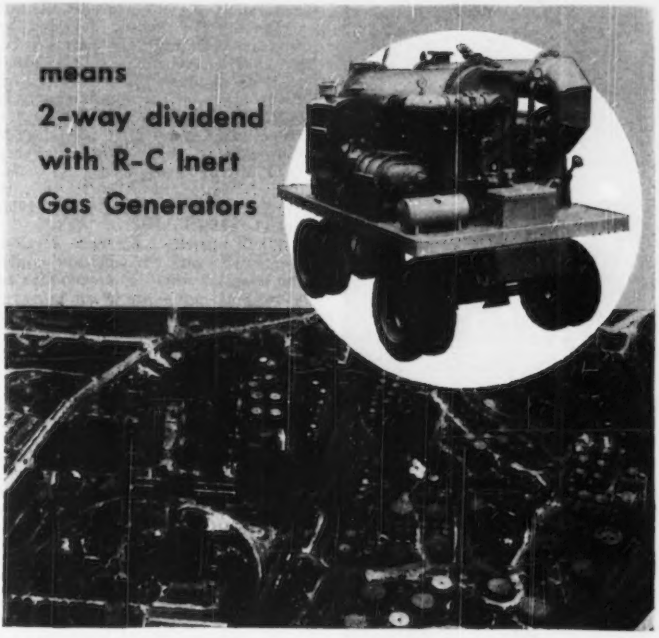

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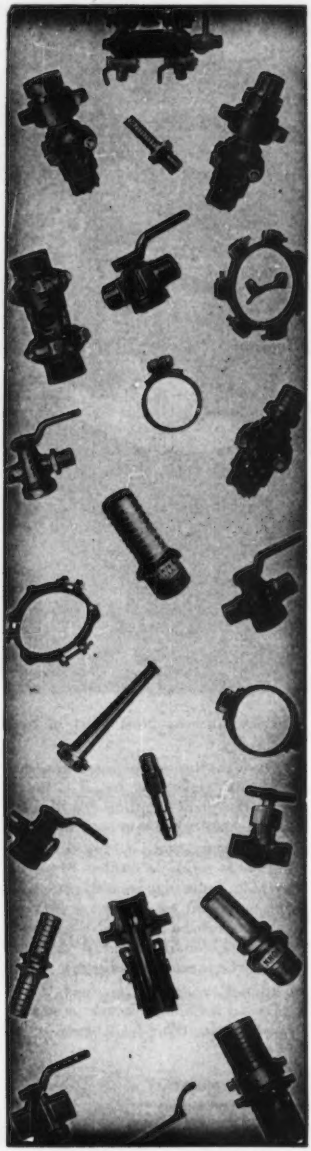

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IN CANADA

• Yukon highway completed

• Golden Manitou plans expansion

★Gold miners are not enthusiastic about the results of **"freeing" the Canadian dollar** and the changes made this fall in the government's cost-aid program. The dollar, devalued by 10% in 1949, has been partially released from control with the result that its discount in terms of U. S. funds has been cut approximately in half. The effect of this has been a reduction of about $1.50 per ounce in the price of gold. The Emergency Gold Mining Assistance Act, scheduled for termination at the end of 1950, has been extended through 1951, but at reduced rates.

While the effect of these developments will vary for different mines, the average result is a reduction of about $1.75 per ounce in the price received for gold. As operating costs have been rising steadily, the over-all picture has not been brightened by these new developments.

QUEBEC

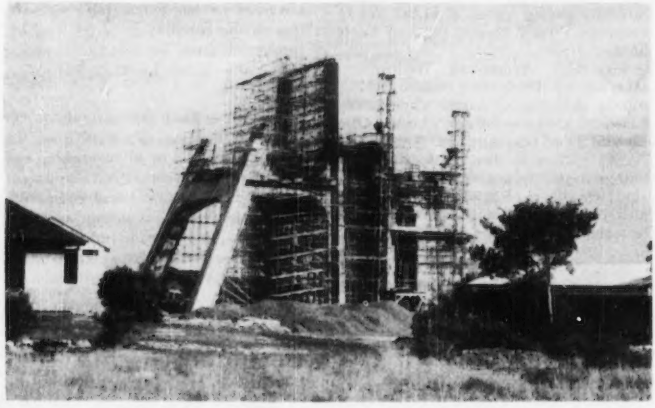
★**Plans for a 500-ton mill addition** are on the drafting boards of Golden Manitou Mines, following development of promising new ore during the past six months. Expansion from the present 1,000-ton rate will probably be authorized in the early part of 1951. The new east orebody, now located on the 1,710, 1,410 and 960-ft. levels, has big tonnage possibilities.

★Two neighbors of Golden Manitou, **Lavalie Mines and Wildor Mines,** encouraged by the big producer's recent success, have started surface drilling.

★**Surface drilling has been started by Macdonald Mines** on its property in the Noranda area, the probe being conducted outside the shaft section which is leased to Noranda Mines. The latter section, some 50 acres in extent, contains the underground workings in which 9 million tons averaging 80% pyrite and 3.5% zinc, as well as an additional 9 million tons of the same pyrite content, but with considerably less zinc. Noranda plans to produce iron and sulphur, treating the ore at its own nearby plant. MacDonald will have choice of payment by royalty or by percentage of profits. Minimum payment is to be $100,000 per year during the 50-year lease, whether production is carried on or not. The lease can be cancelled by Noranda on six months notice.

During the past summer MacDonald drilled from underground to explore adjacent parts of the unleased area, but obtained no definite ore indications.

★Quebec Chibougamau Goldfields **has met with considerable success** in diamond drilling a copper-zinc-silver zone on the northeast tip of Merrill Island on its Chibougamau district property. Two deep holes have clicked with 20 and 30-ft. sections of higher than average grade ore. Values averaged about $18.



FIRST REINFORCED CONCRETE HEADGEAR in the Union of South Africa goes up at the Margaret Shaft of the Stilfontein gold mine in the Western Transvaal. The shaft will be sunk to about 5,000 feet. It will accommodate 6 cages and will require 3 winders, each of 3,500 hp.

The company has also started drilling on its nearby Dore Lake property. This program is being carried out jointly with Merrill Island Mining Corp. which holds the adjoining ground.

★**Good progress is being made by Lake Wasa Mining Corp.** in lateral work on its new 800 and 1,000-ft. levels. First results suggest ore dimensions at least as large as those obtained at shallower horizons, with grade somewhat higher.

★Nubar Mines, formerly Roybar Uranium and Gold, is **sinking a three-compartment shaft** on its Meston property, Macho River district, 80 miles northeast of Senneterre. First lateral work will be done on the 125-ft. level.

★**Best operating results in ten years** are anticipated by Powell Rouyn Gold Mines for its fiscal year that ends next March 31. Net profits should be close to 20c. per share, compared with 10.6c. for the year that ended Mar. 31, 1950. Ore reserves should be up, too, as new orebodies have been located on both the 1,400 and 1,850-ft. levels, while the 2,450-ft. level is opening up as one of the best in the mine.

ONTARIO

★To explore another 600 ft. of depth, Pickle Crow Gold Mines is **starting to deepen its No. 1 shaft** to 3,000 ft. The program will permit further searching of the Howell vein, the mine's original ore source, and also investigation of the new sulphide ore outlined in drilling from the 2,450-ft. level earlier this year.

★**New Dickenson Mines,** with grade more than doubled at $20 per ton, is profiting from the higher grade ore developed this year and building up its cash position at the rate of $75,000 per month.

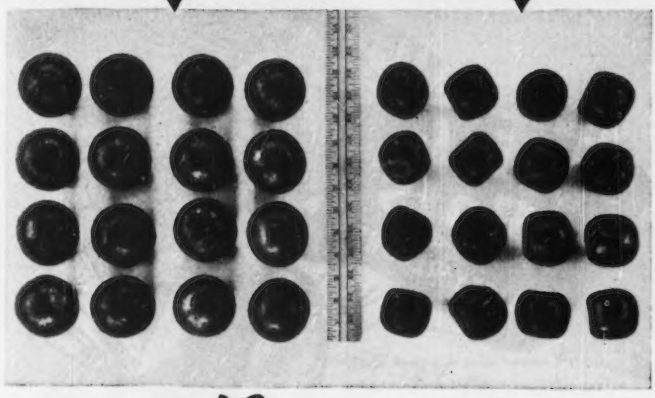
★**Net profits of Cochenour Willans Gold Mines** in the first nine months of 1950 were 11.8c. per share before cost-aid, compared with 6.8c. for the whole of 1949. Gold production of this Red Lake oldster was $1,053,385, against $1,071,610 for the whole of 1949, with the result that output for the current year should set a new all-time record.

★**Another gold mine that doubled its 1949 profits** in the first nine months of 1950 is Porcupine Reef. Operating profits to Sept. 30 are estimated at $285,000 versus $134,554 for the previous 12 months.

★**Operations of Dominion Magnesium** are running at the highest rate in the company's history. Thanks to a rush of business brought on by the defense program, Canada's only magnesium producer, with mine and plant in Renfrew County, Eastern Ontario, is again making money.

★**Gross output of Steep Rock Iron Mines this year will exceed $10 mil-**

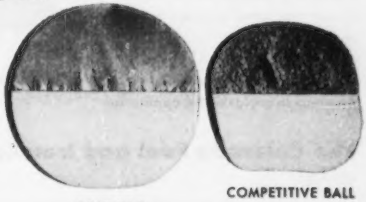
SHEFFIELD MOLY-COP COPPER-MOLYBDENUM-ALLOY VS. COMPETITIVE FORGED BALLS



THERE *IS* A DIFFERENCE IN FORGED STEEL BALLS

Again, the longer wearing qualities of Sheffield Moly-Cop balls have been demonstrated. This time in a test grinding barite ore at Magnet Cove Barium Corp., Malvern, Ark.

An equal number of Moly-Cop and competitive forged steel balls were charged into the same mill at the same time and were recovered after 4604 operating hours. All were originally 3½ inch nominal diameter and marked for identification.



MOLY-COP COMPETITIVE BALL

The recovered test balls are shown in the top photograph. Clearly evident is the difference in rate of wear. The *competitive forged balls wore 38% faster,* based on average diameter loss. Note also the pronounced difference in retention of spherical shape.

Typical fractures of the two types of test balls are shown in the lower photograph. Note the fine, hard, martensitic grain structure of the Moly-Cop ball.

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DENVER

PRODUCTS OF CF&I

FORGED STEEL GRINDING BALLS & RODS

Ontario *(Continued)*

lion, of which more than $2 million will be net profit. The company's big expansion program is well in hand and the prediction can be made that production by 1954 will run between three and four million tons, compared with 1.2 million tons this year. Additional to this would be production from the section under option to Inland Steel Co. Inland did considerable drilling last winter, is now doing more, and is unofficially said to have encountered fine encouragement.

As consideration is now being given to similar royalty options with other steel companies on adjoining parts of the huge northwest Ontario property, Steep Rock shapes up more and more clearly as a big profit maker.

YUKON

★**Yukon Consolidated Gold Corp. Ltd.,** operating eight dredges on creek and river beds in the Klondike, has recovered close to $2 million in gold values at the end of September, and company officials report indications are that 1950 may be the best postwar year so far with gold output approaching the all-time record level of 1942.

★**The last line of the new 247-mi. highway connecting Whitehorse with Mayo, has been completed.** The all-weather road, built to aid development of one of the largest lode mine areas in Yukon Territory, provides direct access from the Keno mining districts to Whitehorse and joins the Alaska Highway at a point 10 mi. from Whitehorse. The route runs north from the Whitehorse area through Braeburn to Carmacks, Minto and northeast to Mayo. Even before this year's work was completed the new highway had been put into service.

★**Preliminary work on a power project** on the Mayo River in the Yukon is being started this year by the Dominion government. The project is expected to cost about $3 million and take two or three years to complete, producing about 3,000 hp. initially with the amount to be increased to meet added demands. The power will be sold mainly to mines in the Mayo district, particularly the Keno Hill mines. Bids have been asked for preliminary rockwork, involving blasting out sites for a dam and powerhouse. Tunnels also will have to be dug from behind the dam to the power turbines.

NORTHWEST TERRITORIES

★**Quarterly net profit** of $340,266 is reported by Giant Yellowknife Gold Mines Ltd., for the period ended Aug. 30. Gold recovery of 27,987 oz. from 39,034 tons milled, plus 8,781 oz. silver brought gross value of production to $1,083,135.

★A reported promising **uranium ore discovery on Great Slave Lake has been discounted** by L. E. Drummond, secretary-treasurer of the Alberta and Northwest Chamber of Mines & Resources, and agent and sub-mining recorder for the Northwest Territories' administration of the federal Resources Department. Mr. Drummond suggests it may have been made in the Lake Athabasca district. The uranium find was reported by the Minneapolis Tribune, in a copyrighted story, as having been made on Great Slave Lake.

★A new orebody has been discovered by **Giant Yellowknife Gold Mines, Ltd.,** operating in Great Slave Lake area. The orebody, defined by diamond drilling from the fourth level of the No. 2 shaft area, apparently extends over a length of 260 ft. Samples obtained by drilling assayed from .32 to 2.11 oz. gold per ton.

BRITISH COLUMBIA

★A new nickel-producing process perfected by **Prof. Frank Forward** of the University of British Columbia at Vancouver will be used by Sherritt Gordon Mines. The process, cheaper than any in use at present, will be brought into commercial use at Lynn Lake, Manitoba, in 1953.

The development is a leaching process in which nickel concentrate is dissolved in ammonia, with nickel, copper and cobalt being extracted. The solution is treated chemically to recover the three metals separately.

★Consolidated Mining & Smelting Co. of Canada still is studying plans for establishment of a blast furnace at Trail to produce iron from tailings at Kimberley. Cominco is making good progress in redeveloping the old Bluebell mine at Riondel, in the Kootenay Lake district, with the expectation the property will be in production in a year to 18 months. Work is also underway in the underground exploration program at Tulsequar Chief and Big Bull properties, and further studies are being concentrated on the H.B. property near Salmo.

★Pacific Asbestos Corp. formed recently to work a rich new asbestos find at Sproat Mountain, has started a large-scale development under direction of Dr. Victor Dolmage, consulting geologist. Open cuts in the discovery zone have shown both slip and cross-fiber types of asbestos. Quality of asbestos compares favorably with the higher grades offered on the world market, according to Dr. Dolmage. The property purchase agreement calls for start of production by September, 1951.

★Meanwhile, Conwest Exploration & Mining Co. of Toronto has taken an option on asbestos claims in the McDame Creek area of the Liard mining division. The company is planning diamond drilling and further exploration.

★First phase of a $200,000 development program on the American Boy claims, base metal property of American Standard Mines Ltd., New Hazelton, is underway. The work will follow consultant Dr. J. J. Mandy's recommendations for 2,000 ft. of drifting on known veins; 900 ft. of crosscutting, 1,400 ft. of raising and 25,000 ft. of short-hole diamond drilling.

★Plans for the installation of a mill with 150 tons daily capacity at the Estella Mines' property near Wasa in East Kootenay are well developed, with an exploration and development program underway. Development work includes diamond drilling at depth to discover the depth of the orebody. Originally staked in 1900, the Estella is officially reported to have a 700-ft. orebody showing 23% zinc, 7% lead and 2 oz. silver per ton.

★Vananda Mines (1948) Ltd., Texada Island, made its fifth and sixth shipments to Tacoma smelter during September, with the fifth shipment totaling 941 tons with average grade of 0.13 oz. gold per ton and 1.15% copper. Tonnage of the sixth shipment was 1,065, grading 0.182 oz. gold per ton and 1.4% copper. Net smelter return for the two shipments was $16,000, based on a discount of 4% on the Canadian dollar.

★Noland Mines, Ltd., with placer leases on Spruce Creek in northern B. C., has acquired the hydroelectric plant and mining claims on nearby Discovery Mines & Power Co. Ltd., Noland, started deep-lead mining this year on the Spruce Creek placer

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94%+ removal on a dust count basis by Type W Roto-Clone serving secondary crusher in rock house of large copper mine.

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CASE HISTORY NO. 2

Type N Roto-Clone, exhausting sintered lead ore at crushers, removes 98.2% of dust by weight.

TYPE N ROTO-CLONE

CASE HISTORY NO. 3

99.7% dust removal by Type W Roto-Clone on copper ore milling operation.

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British Columbia *(Continued)*

leases. Operations, although still in the development stage, have been averaging about 1,100 oz. gold monthly from gravel yielding more than $25 a cu. yd.

★Quatsino Copper-Gold Mines Ltd., which owned 42 crown-granted claims on northern Vancouver Island, has resumed operations. Present copper prices led to the decision to develop by diamond drilling a known mineralized belt in Quatsino ground. Henry Hill, formerly engineer in charge of Reeves Macdonald Mines, will direct operations.

★Good progress is being made in the installation of a new 100-ton daily capacity mill at Base Metals Mining Corp.'s Cork Province mine in the Slocan. Shipments of ore from development are continuing to the mill of Whitewater Mines, with grade considerably below mine average. No mining is being done on developed ore which is being held in reserve for treatment in the new mill.

★At the Base Metals-controlled Vancouver Island Base Metals property, renovation of camps, plant and equipment has been underway. Underground operations are to start immediately in preparation for production from the fully-equipped 150-ton daily capacity mill.

★Emerald Glacier Mines is speeding up plans for development of its high-grade lead-zinc-silver property on Sweeney Mountain in the Omineca mining division. The company, financed by Kenville Gold Mines and Quebec Gold Mining Corp., is already building a road to the property where an estimated 10,000 tons of proven and probably ore is at hand above the main adit, with an additional 250,000 tons reported by the company's engineer as possible.

★Red Hawk Gold Mines Ltd. has obtained good results from initial surface exploration on the Gold Cure group of claims in the Slocan district, on which it holds an option. Surface work has traced the main vein system on the adjoining Gibson to the south through the entire length of the four Gold Cure claims into the property of the Bismark Mining Co. Workings of the Bismark mine are 300 ft. from the Gold Cure north boundary. Red Hawk is proceeding with arrangements for a systematic program of diamond drilling spaced along the proven vein system crossing its ground. Much overburden covers the vein.

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★Utica Mines, Ltd., is closing down its property at 6,500-ft. elevation on Paddy's Peak near Kaslo, Slocan, due to the great depth of snow expected and consequent difficulty in keeping roads open. The mine will be reopened in the spring.

★Favorable development results are reported by Silver Standard Mines Ltd., on several parallel veins. New information on No. 8 vein is encouraging, while a new oreshoot has been located on No. 1 vein 100 ft. below any previous development.

LABRADOR

★Arrangements for financing the development of the Labrador-Quebec iron ore deposits to the amount of $200,000,000, have been made, according to an announcement by George M. Humphrey, president of M. A. Hanna Co. This is probably the largest initial development that has ever been undertaken in a mining venture. Plans call for an immediate start in construction of mining, railroad and handling facilities. Ore shipments should start in 1955 and soon reach the rate of 10 million tons a year.

★J. R. Timmins, president of Quebec North Shore & Labrador Railway Co., has announced that a contract for building the 360-mile railway from Seven Islands to the Labrador-Quebec iron ore deposits has been let to a group of contractors. Equipment is now being moved in and construction will begin before winter.

IN EUROPE

★**No one used the word "cartel"** in referring to the World Tin Conference that met in Geneva, Switzerland, on Oct. 25, yet a kind of cartelization of the world's tin mining industry was what all the delegates, except the United States, had in mind. They referred to it as a "stabilizing commodity control agreement."

Basis for the conference was a draft agreement drawn up some time ago by the International Tin Study Group, which includes all the tin producers and the major consumers of tin. Despite U. S. opposition, this group approved a plan calling for administration by an International Tin Council of a kind of "ever-normal granary" of tin. Metal would be either stored up or released by this Council to counteract the effect of swings in demand for tin. Objectives would be to stabilize prices, production, and employment, and to provide adequate and properly developed sources of tin.

The skyrocket zoom of the tin market just as the conference opened gave point to the Group's suggestions. Many delegates felt that U. S. opposition to anything resembling a cartel would melt considerably in the face of the fact that tin which the U. S. stockpiled so eagerly at around 70c. per lb. had shot up in a matter of weeks to a peak of $1.70 per lb., only to curve off again in an uncertain slide. But despite a softening in the U. S. attitude on "buffer stocks" of tin, the meeting broke up Nov. 21, with nothing done.

The final split came over U. S. insistence on leaving such stocks open to sale to countries needing tin for strategic stockpiles. The others all refused. The U. N. Secretariat can call another meeting, if it seems a good idea.

★**With Marshall Plan funds** making up about 20% of the financing, the French aluminum industry is looking toward increased production and lowered prices that it is hoped may eventually be brought down to the Canadian level. Production is expected to reach 61,000 tons in 1950, against 1949's 44,000 tons. Exports of aluminum will reach about 15,000 tons, with Great Britain the principal customer.

★**Norway has set up a new State Mining Company** with a capital of £100,000 to develop niobium deposits at Holla, Telemark. Niobium is used in high-temperature alloys such as are used for jet engines and gas turbines. Few niobium deposits are known in the world. All the Norwegian output will be exported.

★**Extremely rich nickel deposits** have been found at Ulvsby, near Bjoerneborg in Finland. Latest reports say nickel content of the ore runs 1½%. The orebodies, also carrying copper, gold, and platinum, are reported to be larger than those at Petsamo, ceded to Russia after the war, by treaty.

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IN LATIN AMERICA

MEXICO

★**Both of Mexico's large coal mines** were still troubled by labor disputes early in November, although prospects for a settlement were brighter. Palau, where 1,400 men were idle since September, was guarded by troops sent in by the National Government to keep order. The coal mine at Rosita was still running, although plagued by a series of only partially successful sit-down strikes. The Communist wing of the National Miners' Union boasted openly that it was getting financial help from the Red-led World Labor Federation, but its strength seems rapidly dwindling. Government opposition to the Communist's tactics is blunting their effectiveness.

★Preuser & Martinez are building a new 100-ton lead-zinc flotation mill at Zimapan, Hidalgo, to treat ore from **the Balcones mine** there.

★Decision of the Banco de Mexico to **stop selling silver** on the open market, at least until a decision had been

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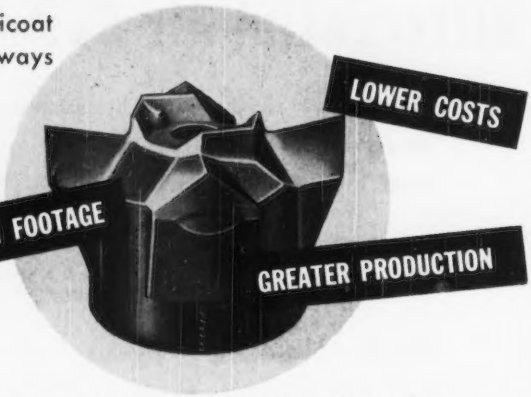

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Mexico *(Continued)*

reached on an export tax, is still not fully understood by Mexican mining circles. However, it is generally agreed that the Banco was successful in its aim of getting a good price for silver.

CHILE

★Because of increasing competition from **the synthetic nitrogen industries**, the Chilean Government will allow producers to return to the country only $20 per ton of sodium nitrate exported until the end of June, 1951. The companies will also expand their use of the cheaper solar evaporation method of producing nitrates. By the end of June, 1951, production from the new units should be running at about 50,000 tons a year. Expenditure on new facilities will be about $4,500,000.

★After a legal strike that closed the entire operations of **Andes Copper** recently, a settlement was reached calling, among other items, for a 21% wage increase.

★The Director of Internal Revenue recently expressed his approval of a **single tax for small mining enterprises.** It would amount to 1½% of the net value of all ores and concentrates sold. Such a tax would be easier both to calculate and to collect than the present income tax.

★**Spain and Chile** have signed a trade agreement covering shipment to Spain of 200,000 tons of nitrate and 3,000 tons of copper per year.

★What appear to be **important manganese desposits** have been found near the station of Alcerreca on the railroad between Arica and La Paz, Bolivia. Grade is said to be between 42% and 52% Mn. A company called Cia. Explotadora de Manganeso de Tarapaca has been formed to mine these deposits.

★**A copper fabricating plant** is being built by the Government at Cerillos. It will produce wire for the most part. The Government recently authorized import of $250,000 worth of machinery for the plant, the first of its kind in Chile.

★The Ways & Means and the Economics Committees of the Chamber of Deputies flew recently to Paipote to examine progress on the **new copper smelter** there. After going into all phases of the work, the group expressed complete satisfaction with the way the work is being handled and expressed their willingness to approve funds to carry the job to completion.

PERU

★**Corporacion Peruana de Manganeso** has been formed by Pedro Rossello to work a large manganese deposit in the province of Carabaya, between Tirapata and Macusani, in the Department of Puno. A trial shipment of 750 tons of ore that went to the U. S. recently proved to assay about 60% in manganese and very low in phosphorus. The company will equip the mine for large-scale production.

★**The Candelaria** mine in the jungles of Puno about 120 miles from Macusani has been examined lately with a view to setting up a large cyanidation plant. The region is rich in gold veins, and the mine itself has been worked on a very small scale over the last 15 years. Transportation difficulties have held up larger operations. A trip to the mine requires three days' travel by mule.

★On Oct. 20, the hydroelectric installations the **Corporacion Peruana del Santa** is building at Huallanca, inland from Chimbote, were severely damaged by a freak avalanche. Apparently a large block of ice fell from a glacier into one of the ponds at the head of Los Cedros Valley. The resulting wave washed out the moraine that had dammed the pond, and turned a flood of debris into the valley. Several large transformers, three cranes, an auxiliary plant, several railroad bridges, and large sections of right of way and highway were lost. The hy-

droelectric plant forms the basis of a plan to establish a steel industry eventually in Chimbote.

BRAZIL

★**Iron ore exports** from the port of Victoria reached a new record during September of 122,000 long tons. The Cia. Vale do Rio Doce, which exports through Victoria, has increased its output. Production for 1950, through September, totaled 521,000 long tons, against 325,000 tons for the same period last year. It is unlikely, however, that the 1950 total will reach the announced goal of 750,000 tons.

★Production at the **National Steelworks at Volta Redonda** continues to climb. Production for the first half of 1950 was 198,351 metric tons, 67,000 tons more than for the first half of 1949. Pig iron output was up 85,000 tons to 171,648 metric tons. Output of pig iron is now in excess of Brazil's requirements, and there is talk of putting pig iron on the list of commodities available for export trade deals.

★Returning to work after a long layoff for the election, the Brazilian Chamber of Deputies (the lower house) passed and sent to the Senate two bills concerning mining. One would prohibit **export of atomic minerals.** The other would guarantee a loan of $35,000,000 by the International Bank for Reconstruction and Development to the Brazilian company (Industria e Comercio de Minerios) which plans to develop manganese desposits in Amapa in partnership with **Bethlehem Steel Co.** The properties are now being explored, but if development proceeds, no shipments could be expected much before 1954.

IN AFRICA

★Latest in the list of ECA's contracts for foreign strategic minerals was a deal with France for substantial tonnages of Moroccan cobalt for the U. S. stockpile. The contract calls for shipment of 7,200 tons of cobalt concentrate before Nov. 1, 1952, by the **Soc. Min. de Bou Azzer et du Graara** of Casablanca. One half the purchase price will be paid in dollars and one half in Marshall Plan counterpart funds.

The cobalt mines are separated from Casablanca by 300 miles and two mountain ranges. Concentrates will be brought out over the Atlas mountains by truck on a road said to have more curves per mile than any other in the world. The ore carries 12% cobalt. Output will be increased under ECA's

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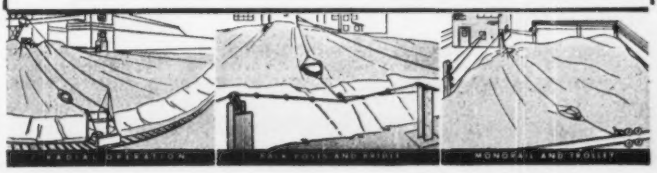

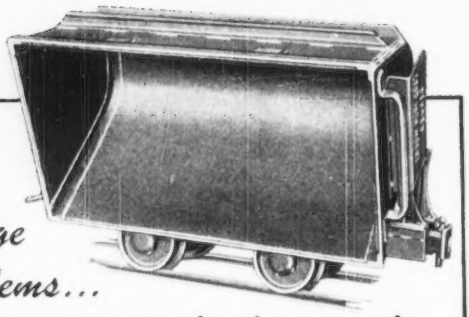

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Africa *(Continued)*

modernization program from about 3,000 tons a year to around 7,500 tons.

Other ECA deals in French Overseas Territories include: New Caledonian nickel; Moroccan lead and zinc; Equatorial African diamonds, tin, copper, chromite, manganese, and asbestos. Considerable controversy has arisen over ECA's assistance to French diamond mines in French equatorial Africa. The French claim the South African diamond interests are throwing every conceivable road-block in the way of the project.

★France received more than **100 tons of uranium ore** recently from the Tete district in Mozambique. Mined by a Portuguese East African mining company, the ore carried up to 10% uranium oxide and varying percentages of niobium, thorium, tantalum, beryl, zircon and radium. A rush to stake claims in several Mozambique districts is on, with uranium, gold and copper being sought.

★A. A. Linari-Linholm of the Diamond Research Laboratory in Johannesburg described at a recent meeting the Chemical, Metallurgical and Mining Society of South Africa a method of **concentrating diamonds electrostatically.** The diamond-bearing tailings from the conventional grease tables can be passed over a brass drum carrying a charge of about 20,000 volts. The diamonds cling to the drum long enough to be separated from the gangue.

★**Shortage of skilled labor** in South Africa is so serious that any new foreign enterprises starting up in the Union are asked to bring their own artisans with them. About 3,000 skilled men in various trades are needed badly.

★**In the Orange Free State,** first results of driving on the Basal Reef in Welkom No. 2 shaft showed 100% payability over the first 45 ft. sampled. Assays gave 404 in. dwt. At St. Helena Gold Mines Ltd., the permanent equipment of No. 4 shaft was completed. Development totaled 2,701 ft. for the quarter ended Sept. 30, of which 405 ft. were on Basal Reef, 315 ft. proving to be payable.

★In order to reduce tax burdens, five companies of the Anglo-American mining group are **moving their headquarters** from London to Northern Rhodesia. They are: Rhodesia Copper Refineries, Ltd., Rhodesia Broken Hill Development Co. Ltd., Rhodesian Anglo-American Ltd., Rhokana Corporation Ltd., and N'Changa Consolidated Copper Mines Ltd. Combined capital of the companies exceeds £24,000,000.

★The Minister of Mines of South Africa has granted a mining lease covering 5,560 claims to the **Stilfontein Gold Mining Co.** in the Klerksdorf district of the Western Transvaal. Shaft sinking began a year ago. One shaft is down over 2,000 ft. and the other is down below 500. Hoisting equip-

ment was installed during the summer and orders have been placed for heavy machinery for the reduction plant.

IN AUSTRALIA

WESTERN AUSTRALIA

★**Gold Mines of Kalgoorlie Ltd.**, in the year ended March 31, treated an average of 12,555 tons per four-weekly period, 155 tons more than in 1948-49. The gold return was 41,337 oz., equivalent to a yield of 5.07 dwt. per ton. Profit amounted to £139,862 (sterling), an increase of £73,919 over the preceding year, although operating costs advanced 4.11 shillings per ton to 37.82 shillings. As the increased gold price only operated for about six months of the financial year, its effect on income and costs is not fully reflected in the accounts.

★**At Central Norseman Mining**, additions to the mill and powerhouse are approaching completion. Output has reached a rate of 150,000 to 160,000 tons per annum.

★**At New Coolgardie**, the Barbara section developments have disclosed the continuation of high-grade ore in depth. At Burbanks some long runs of payable ore in shallow synclines have been developed. Production from this mine is about to begin. The preparatory work for bringing ore from the Callion mine into the mill is also well advanced. Extensions to the mill are nearly completed. Output is increasing and it is expected that it will in all probability, exceed 4,000 tons per four-weekly period within the next few months.

★**Hill 50 Gold Mine** earned £50,160 in the year ended June 30, after providing £10,294 for depreciation. The mine treated 53,317 tons for a return of 12,622 oz. The ore treated would not have been payable at the pre-devaluation gold price.

★**North Kalgurli (1912) Ltd.** has begun sinking its new main shaft. It will be the largest on the Golden Mile. Winding equipment has been purchased from Wiluna Gold Mines. Immediate objective of present sinking operations is 1,560 ft.

★**A party working the New Mexico mine** in the Ora Banda district has won $45,000 worth of gold in three months. A recent parcel of 17¾ tons of ore produced 135 oz. by amalgamation. The average yield by amalgamation was 7¾ oz., with another 3 oz. left in the sands.

★**Western Australia's gold output** in July was 46,152 oz., 2,680 oz. less than for the previous July. Total Australian gold production for the seven months to July was 487,916 oz., a

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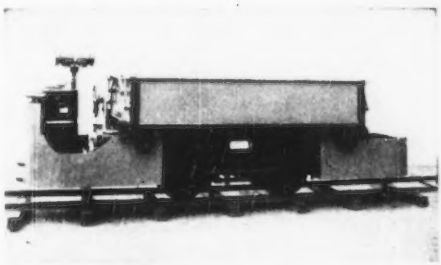

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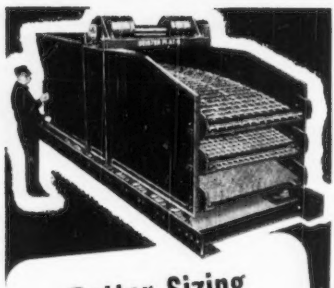

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Australia *(Continued)*

decrease of 27,723 oz. compared with the same period last year.

NORTHERN TERRITORY

★Common features of the **Rum Jungle and Fergusson Creek** uranium finds are believed to suggest avenues for further prospecting. Both discoveries are on the fringes of a lower Proterozoic granite formation bordering on sandstone and quartzite. The two finds are more than 150 miles apart, but they are linked by the same geological formation along the Fergusson River both sides of the main North-South Highway. There are two long-established mining fields in the area—Pine Creek and Brock's Creek—and it is thought possible that prospectors have been mistaking radioactive minerals for ordinary copper ore, the uranium ore being a high-grade hydrous copper-uranium phosphate.

VICTORIA

★**Victoria's gold yield** for the first nine months of 1950 was 42,947 oz., 7,223 oz. less than in the corresponding period of 1949, but September production, 6,844 oz., was the highest for any month in 1950 and 312 oz. higher than in September last year.

★**Central Nell Gwynne,** Bendigo, is not considering resumption of operations because of the shortage of skilled labor and the high cost of stores. The mine has been closed for some time.

★When reconditioning of dredged areas has been completed, **Victoria Gold Dredging Co. N. L.** intends to go into liquidation. Delays in the delivery of steel and other materials and shortage of skilled labor have retarded reerection of the Amphitheater dredge by Central Victoria Dredging Co. N. L. By the time the dredge is in commission, the company expects to incur a deficiency of about £75,000. The same company's Jim Crow dredge has so far dredged 1,111,000 cu. yd. for an average yield of 2.1 grains.

TASMANIA

★**Mt. Lyell Mining & Railway Co. Ltd.** treated 1,516,832 tons of ore in the twelve months ended Sept. 30. This compared with 1,426,111 tons in the preceding twelve months. Production of blister copper, refined copper and silver was approximately doubled and gold production gained even more on the preceding year. Figures for the twelve months ended Sept. 30, with those for the preceding year in brackets, are: Blister copper, 8,072 tons (3,871); copper, 7,991 tons (3,840), silver, 27,851 oz. (14,089), and gold, 5,326 oz. (2,394).

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NEW SOUTH WALES

★Production of ores and concentrates by **North Broken Hill Ltd.** for the year ended June 30 showed very slight increases over 1948-49. Actual figures, with those for 1948-49 in brackets, are: Ore treated, 332,305 tons (329,990); lead concentrate, 62,600 tons (61,967); zinc concentrate, 62,239 tons (61,932). Reserves at June 30 were estimated at 5,005,000 tons, compared with 5,151,000 tons a year earlier.

★**Broken Hill South Ltd.** did relatively better, production figures for both years being: Ore treated, 286,670 tons (264,870); lead concentrate, 47,607 tons (44,314) and zinc concentrate, 59,708 tons (55,593).

QUEENSLAND

★The state's industrial laws and the company's policy were such that there could be no occasion for its employees to strike to obtain their just dues, it was stated in the Industrial Court by a representative of **Mount Isa Mines Ltd.**, an American Smelting & Refining subsidiary. Mount Isa was opposing claims for higher wages and lead bonus payments and the deletion of a clause in the company's "award" (terms of employment stipulated by court) which provides for forfeiture of a day's paid vacation for each day an employee takes part in an unauthorized strike.

★The Mount Isa unions had asked the court for 15 to 25% pay increases and for a schedule of lead bonuses starting from a lead price of £16 a ton (1.6 c. a lb.), as at Broken Hill, instead of from £57/10 a ton (5.7c. a lb). The company counterclaimed that because of increased costs the bonus should begin when the lead price was £76 (7.6c.). It submitted that when the present formula was adopted by the court in 1947, £57/10 covered production costs plus a 7% dividend to stockholders. As costs had greatly advanced in the meantime, the company was paying its employees £250,000 a year to which they were not entitled if the bonus was to retain its relation to profits.

According to company figures, employees received £2,069,043 in wages and £1,546,259 in bonuses in the year ended June 30 while stockholders in the same period received £1,468,854 in dividends. Mount Isa paid no dividends on subscribed capital from 1931 to 1947. In 1949 the company paid 25%.

★In the year to June 24, **Mount Morgan Limited** treated 849,500 tons (770,250 tons in 1948-49) for 4,253 tons (3,524 tons) of copper and 79,020 oz. (58,663 oz.) of gold. Ore reserves were estimated at 4,830,200 tons (5,212,406 tons) sulphide and 2,650,600 tons (1,986,786 tons) low-grade ore.

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NEW GUINEA

★Bulolo Gold Dredging Ltd. earned a net profit of $1,207,480 (Canadian) for the year ended May 31, or $387,966 more than in the previous year. Lower costs, because of larger yardage handled and devaluation of the Australian currency, more than offset a fall in recovery values and consequent lower production—70,992 oz. of gold (73,791 oz. in 1948-49). One of the company's eight dredges closed down last year. Five of the remaining dredges have a life expectancy of only two or three years and two of them may be closed down soon unless digging conditions improve. Two deep-digging dredges are expected to give service into the early sixties.

BOOKS RECEIVED

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Aluminum Structural Design. Issued by Reynolds Metals Co., 2500 South Third St., Louisville, Ky. Available to designers, engineers, and architects. Write a letter to Reynolds, requesting the book on company letterhead. Pp. 130.

Proceeding of the United Nations Scientific Conference on the Conservation and Utilization of Resources, Aug. 17-Sept. 1949, Lake Success, New York. Pp. 431. Published by the Columbia University Press, 2960 Broadway, New York 27, N. Y. Price $4.50.

Mining Laws of Canada. A digest of Dominion and Provincial laws and regulations affecting mining. By Arthur Buisson, Department of Mines and Technical Surveys, Mines Branch. Pp. 133. Available at Edmond Cloutier, King's Printer and Controller of Stationery, Ottawa, Quebec, Canada. Price 50c.

A Statement on the Position and Prospects of the Tin Industry. Drawn up by the Working Party of the International Tin Study Group in November, 1949. Contents include: The case for an international in agreement; statistical background of the tin industry; the statistical position and surplus problem; consumption and a surplus; price equilibrium and future output; the tin position of Bolivia; territorial statements for Nigeria, Malaya, Belgian Congo, and Indonesia; and tabular appendices. Available at The International Tin Study Group, 7 Carel Van Bylandtlaan, The Hague, Holland. Price $1 postfree.

Lehrbuch der Bergwerksmaschinen. (Textbook on Mining Machinery) by Dr. H. Hoffman. Fourth edition revised by C. Hoffman, instructor at Bergschule Bochum. Published in German by Springer-Verlag, Berlin W35, Germany. Pp. 403 including 612 illustrations. Price DM 36. A scholarly presentation of the theory and application of mechanical and physical principles involved in design and operation of boilers, steam engines and generators, compressors, turbines, diesel engines, mine hoists, pumps, blowers, rock drills, coal cutters, mine locomotives, ventilation equipment, and other mine equipment. Both coal and metal mining units are illustrated and described.

Arizona Zinc and Lead Deposits, Part I. Arizona Bureau of Mines Geological Series No. 18, Bulletin No. 158. Published by the University of Arizona, Tucson, Ariz. This report covers general features of Arizona deposits and detailed descriptions of the following deposits; Bisbee district, Johnson Camp area, Aravaipa district, St. Anthony area, Superior area, Globe-Miami district, Iron King mine, Bagdad area, and Wallapai mining district. Pp. 144, including 45 maps and figures, some of which are in map pocket. Price, $1.25. (Free to residents of Arizona.)

Procedure Handbook of Arc Welding Design and Practice. Published by the Lincoln Electric Co., Cleveland 1, Ohio. Pp. 1,200. Price, $2 in U. S. A., $2.50 elsewhere, postage prepaid.

Engineering and Mining Journal

1950

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Readers Think for Themselves

(*Continued from p. 73*)

Remedial measures can be put into effect in this district far quicker and at far less cost to the Government than a like tonnage of zinc could be recovered anywhere else. It seems to me time's awastin'."

"The crisis is now upon the metal producers. In all the strategic or deficiency minerals the supplies are far short of the demand imposed by the rearmament effort. As to these minerals, further stockpiling by the Government means the sequestering of badly needed supplies and the limitation of production by domestic companies.

"As to ferro-grade manganese ores, the Government is purchasing and stockpiling cargoes in competition with smelters and processors. As a result many furnaces operate on a hand-to-mouth basis, and one ferromanganese producer has actually had to shut down for lack of ore. There is no hoarding or speculative production of manganese products that I know of; if such activity were suspected, it would certainly be possible for the National Production Authority or the Bureau of Mines to find it out.

"Under present circumstances manganese ore stockpiles are just as strategic in the yards of producers as in the Government stockpile. Why then should the Government continue to stockpile manganese ore or other strategic minerals? It seems to me that the Treasury should retire from purchasing these minerals and only reenter the market if prices drift so low as to discourage foreign production. Under present conditions there is very little chance of that."

The last viewpoint is one which is paralleled currently in several quarters, involving several metals or minerals. On the other side, the stockpilers feel that they have been pilloried most severely by those that complain of lack of accomplishment. They do not care to be caught in the way of the brickbats that will be flying if full-scale war breaks out and they are found deficient.

Production Stimulation Alternatives

In general, there was agreement that some Government encouragement to mineral production is appropriate:

"Obviously the remedy for metal shortages is not price control, but stimulation of production to overcome the shortages and limitation of available metal to essential uses. Also, in my opinion the Government should be realistic in its stockpiling policies."

"I am not one who bemoans the passing of picturesque prospecting. Pick and burro served their purpose, but modern prospecting and exploration is in part the product of exhaustion of easily found surface deposits. Risk in exploration is, for the most part, still not too great for substantial operators, but the development of marginal or submarginal deposits which may be utilized in an emergency seems now to be a well established function of governments. The provision of duplicate or super-normal plant capacities is also a necessary Government undertaking, although provision of amortization over a short period, coupled with tax leniency, would doubtless be sufficient incentive to private industry in some cases."

"With the possible exception of copper, the production of non-ferrous metals in supply adequate for national needs in time of war could only be obtained from the North American continent if the small and medium-sized properties are kept in operating condition. This cannot be done if they are forced as they have been to meet American production costs with prices for metal which are highly competitive with prices of foreign production maintained with much cheaper labor. This is particularly true with the strategic metals."

However, when it comes to details, opinions diverge:

"If adequate production can be assured through income and excess profit tax preferences which primarily affect large operations, I would think this preferable to setting up subsidies and the bureaucratic machinery necessary to their administration. In other words, if the nation's war needs can be supplied by large operations, which are the ones normally affected most heavily by the tax burdens, I see no economic justification for subsidizing small properties just to keep them alive."

"The problems of the smaller properties are not so much tax problems as they are problems of financing, equipping and maintaining properties in operation, and breaking even. Some way must be found of overcoming the higher unit production costs. Theoretically the producer should raise the price of his output to cover these, but without Government protection, he is immediately faced with the limitation of all metal prices which are inadequate to compensate for these costs. The payment of an adequate bonus on the production of all metals, with the exception of iron and copper, added to the American price per ton would seem to be the simplest way of meeting this situation. The tonnage of these other metals produced in the United States would not be so large as to require an undue drain on the Treasury, nor would it unduly enrich large properties. Lead, zinc, and strategic metal production would be greatly encouraged, and by putting the bonus on a unit basis which, if necessary, could be graded with the larger unit basis applying to smaller quantity production, we would avoid the necessity of intimate bureau supervision of mine operation which proved so troublesome during World War II."

"All subsidized tonnage within a district should receive equal treatment under district contracts, not necessarily the same for each district; i.e., a Tri-State contract would be based on Tri-State conditions."

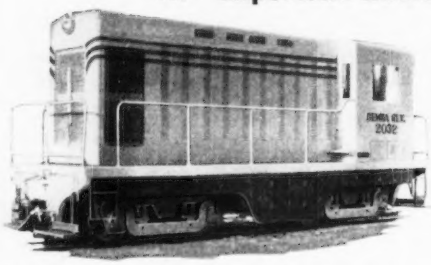
"In case subsidies are to be utilized, as now seems certain, all tonnage should receive equitable treatment. Probably the most effective results in bringing about development of new mines would be achieved by payments on a sliding scale of all producers. The payments should be higher for initial tonnages where assistance is needed and scaled down as output increases and needs lessen. Payments could be more or less automatic and controls kept at a minimum by making settlements for metals produced in a manner somewhat similar to the procedure followed in the silver purchase program."

Excess Profits Tax Unsound

Moreover, when we urged that, given excess profits taxation, any subsidy treatment should be equally applied, some won't accept the excess profits tax in principle. With them, we hasten to concur. An excess profits tax, or any tax

(*Continued on p. 169*)

Count on DAVENPORT RELIABILITY *for* Important Haulage Jobs . . .



BRITISH GUIANA, S. A.

Davenport 54-Ton, 36" Gauge Diesel Electric purchased by Aluminum Company of Canada, Ltd., for use in transport of bauxite ore by Demerara Bauxite Co. in British Guiana.

Most Davenport Locomotives are Custom Built to FIT specific haulage conditions and work to be done. This means that each part and each operation is given individualized attention by skilled craftsmen who are proud of Davenport quality. Custom building sounds expensive. Actually, in the case of Davenport Locomotives, the achievement of FITTED POWER results in Lowest Ton-Mile Costs and results in substantial overall ECONOMY.

FITTED POWER is BEST

It will be a pleasure to receive a detailed description of your operating conditions and range of work. Our engineers, without obligation, will analyze your requirements and recommend the power unit or units best suited for PROFITABLE HAULAGE.

EXPORT OFFICE

50 Church St., New York 7, N.J. Cable Add. "BROSITES"

to Owners of
H. K. PORTER LOCOMOTIVES

We have purchased the locomotive business of H. K. Porter Company, Inc., of Pittsburgh, Pa., and wish to assure all owners of H. K. Porter Locomotives that we are prepared to extend friendly and helpful service on repair parts—or duplicate locomotives to H. K. Porter design.

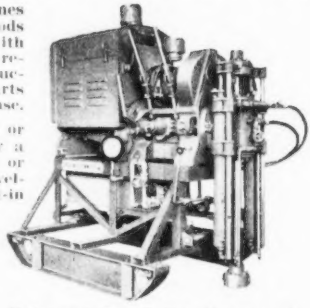
DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

Write Us TODAY

60 YEARS of Successful Experience in DIAMOND CORE DRILLING

enables us to manufacture drilling machines that can be relied upon for long periods of continuous high-speed operation, with greatest possible percentage of core recovery. Modern designs, rugged construction, and liberal use of alloy-steel parts minimize time losses and operating expense.

Swivelheads can be either "Screwfeed" or "Hydraulic." Power-unit can be either a gasoline or Diesel engine, an air engine or an electric motor—each driving the swivelhead and hoisting drum through a built-in four-speed sliding-gear transmission. A complete line of improved accessory equipment provides for every drilling and sampling requirement. Catalog mailed promptly on request.



Model 46-C Core Drilling Machine, with Gasoline Engine Power Unit and Oil Operated Hydraulic Swivelhead.

CONTRACT DRILLING

Besides being manufacturers, we are also one of the largest contractors for any type of Core Drilling—including Grout Holes and Grouting. Experienced crews and supervisors are available at all times for service anywhere in the world. Estimates, and constructive suggestions whenever possible, submitted promptly without charge.

"TRUCAST" BORTZ DIAMOND BITS

have proved their superiority for years in all types of rock formation. Bits may be furnished with various grades of bortz diamonds, set in a matrix of either Beryllium Copper or Beryllium Nickel alloys. Available in a wide range of standard and special sizes ranging from 1½" to 7¾" in diameter.

SPRAGUE & HENWOOD, Inc. Dept. MM Scranton 2, Penna.

which takes the lion's share of profit leaves but little incentive to be efficient at a time when efficiency should be at a premium. Our views on subsidies simply assumed, as do most observers, that an excess profits tax is on the way. This seems to be a matter of political expediency, but the Administration determination to have an excess profits tax has been made clear.

"An equal treatment to all tonnage, if subsidies are utilized, with a concurrent excess profits tax, is not, in my opinion, a very workable proposal. My main objection is to the inclusion of excess profits tax, the many drawbacks are known to you. While the excess profits tax was a very popular project a few months ago, I am beginning to think there is a fair chance that one will not be set up when Congress acts upon tax legislation. It seems to me that it would be less objectionable to go back to the old plan of differential subsidies than to have a uniform subsidy and then scalp off the cream with an excess profits tax."

"I realize that we are headed for excess profits taxation. I am convinced in my own mind that this is a vicious form of taxation and especially so when applied to non-ferrous metal mining. This method of taxation, as you know, taxes the efficient and it is these operations which should be encouraged during a time of emergency. They save labor and other materials compared to their competitors, and when all is said and done, our maximum effort at such times is limited by manpower. . . . If we increase the production of a non-ferrous metal mine and this results in prohibitive taxation on the increased production, we are consuming a valuable asset without proper compensation. . . . For the Government to insist on such increased production with prohibitive taxation on that increase is, in my opinion, mere confiscation of what may be the principal asset of the owner. In my opinion, an excess profits tax applied to such cases may discourage increased production from what may be a cheaper source of production."

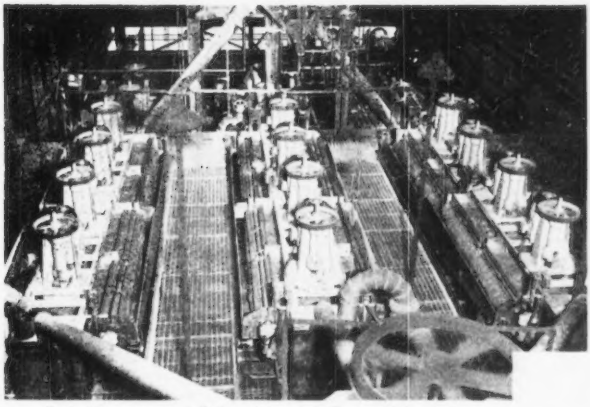
Manpower Solutions

A few suggested ways and means of handling the manpower situation:

"I recommend re-establishment

(*Continued on p.* 162)

ANOTHER CASE OF RESULTS WITH FAGERGREN FLOTATION MACHINES!



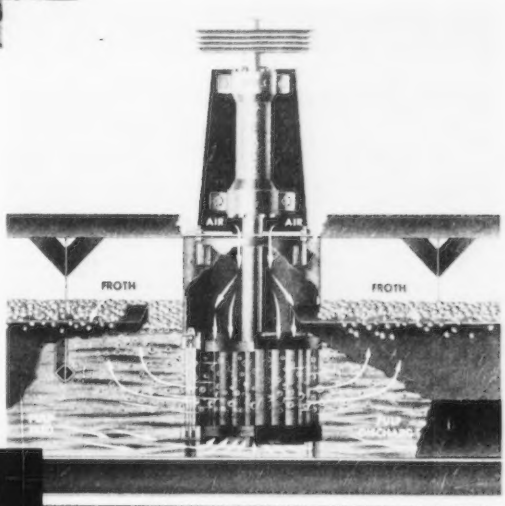
Typical Fagergren installation at American Cyanamid Co. Sydney mine at Brewster, Florida, floating phosphates.

- Zinc concentrate grade up from 57% to 60%.
- Rougher tailings reduced from 2.5% to 0.6% zinc.
- Horsepower and reagent consumption lowered.

Typical of many installations where Fagergrens are used as both roughers and cleaners, these outstanding results were recently reported by a prominent zinc producer. A conversion from another make machine to Fagergrens provided convincing proof of Fagergren superiority in roughing and cleaning.

HIGH METALLURGICAL EFFICIENCY is a direct result of the thorough dispersion of air achieved by the Fagergren rotor-stator design, which together with simple, rugged construction brings these important advantages to operators throughout the world:

- High mineral recovery.
- Minimum reagent consumption.
- Low power consumption.
- High capacity per foot of cell volume.
- Minimum maintenance expense.



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WESTERN MACHINERY COMPANY
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WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioners and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

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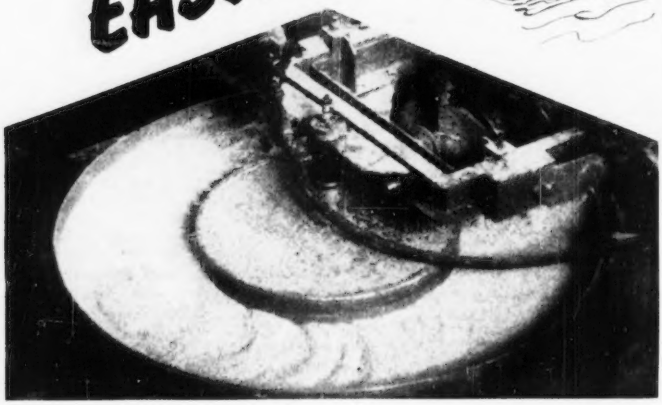
HANDLING OF FAST-FILTERING PULP

EASIEST



OLIVER HORIZONTAL FILTER

EASIEST CAKE FORMATION —pulp pours downward onto a horizontal table, spreading out to form a uniform cake of desired thickness.

EASIEST CAKE DEWATERING—gravity aids the vacuum for filtrate removal at all times, not just during part of the revolution.

EASIEST CAKE DISCHARGE —simple revolving scroll picks off the cake cleanly and without damage to the cloth, chuting it to car, conveyor or bin.

The Oliver Horizontal Filter has definitely proved its place in the field of filtration. It has earned a place on the well-known Oliver United team of ore filters: Olivers, Americans and Dorrcos. If you are processing ores which produce fast-filtering pulps with a high percentage of crystalline solids, consider the Oliver Horizontal Filter which is available in many sizes. Send for our Bulletin No. 218.

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of a straight-time six-day work week with work bonuses for increased efficiency and encouragement for night shift work where it would be applicable."

"Manpower is probably the most serious problem today in all mines, and as it involves the human equation, it is the most difficult to solve. Exclusion from draft should be offered to mine employees, but only if they stay in the mine. There are too many cases where such exclusions were granted in the last war and the employee went into the shipyards, which had a like manpower preference. The problem of improving all labor relations can best be made by a hands-off attitude on the part of Federal bureaucrats, but a revocation of draft exemption should be promptly made if strikes or walk-outs are invoked.

"Finally, there should not be delay in putting these measures into effect until the serious war emergency arises. It takes time to equip and develop a strategic metal mine. Competent labor forces, particularly skilled labor forces, cannot be built up overnight. Provision should be made so that all of our strategic metal mines which are now for the most part closed down could be reopened, development work done, and a skeleton force of critical mine employees be kept available."

Regret for Future

Summing up, it is clear that most of our commentators have a strong distaste for Government controls and little enthusiasm for Government financing of mineral development. Without knowing just what to do about the encroachment of Socialism in the face of such pervasive forces as the need for armament, foreign aid, and the destructive-to-free-enterprise tax burdens that are the inevitable corollary, they still have a sincere dread of the consequences to future generations. Knowing from experience the benefits of free institutions, they hate to see these institutions dying by inches before their eyes as the result of forces seemingly beyond their control. Despite these misgivings, they are prepared to cooperate in whatever steps seem necessary to assure national security, hoping, however, that the framers of Government policy will make a sincere effort to preserve the elements which have made our life in these United States the most privileged in all human experience.

Fit Thermoid Quality and Experience into Your Belting Picture

Thermoid high quality stems from continuing research and product development. To complete this picture, your Thermoid distributor and the Thermoid field representative, working as a team, offer you practical experience in solving your particular problem.

Whether it's run-of-the-mill or something "special", your Thermoid distributor can help you select the right Thermoid Conveyor Belt. And the down-to-earth advice of Thermoid field representatives is welcomed by men faced with belting trouble in mining, quarrying and construction operations. They know this advice is the result of day-by-day experience with conditions *in the field*.

It Will Pay You to *Specify* Thermoid

If your belting fails prematurely—if you're stumped with a tough belting problem—call your Thermoid distributor. Together with the Thermoid field representative, he can help you get greater economy, efficiency and tonnage for your belting dollar.

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

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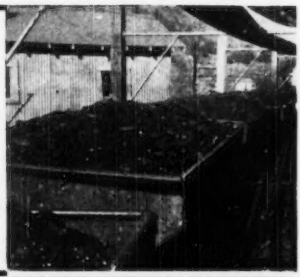
THE S-D "FLOATER"...

America's No. 1 Mine Car Wheel!

"FLOATERS"

FOR FASTER . . . CHEAPER HAULING

Independent engineering firm tests prove that locomotives can pull up to 50% greater loads with no additional power requirement when cars are equipped with S-D "Floaters" instead of other types of precision bearing wheels . . . a big power and time saver!



"FLOATERS"

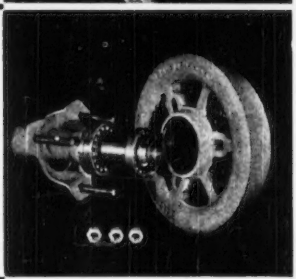
FOR LESS MAINTENANCE . . .

With "Floater's" solid closed front hub, and back double seal, grease stays in the wheel, dust and dirt stay out. Often "Floaters" require greasing no more than once in five years.

"FLOATERS"

FOR QUICK DEMOUNTABILITY

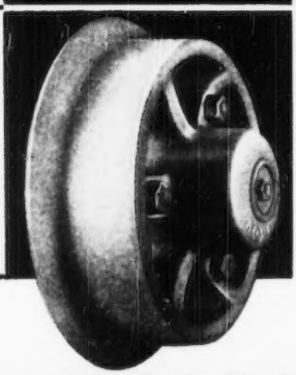
Any unskilled worker can remove and replace a "Floater" as easily as changing an automobile wheel. Bearings always remain in perfect adjustment on axle. When replaced there's no chance of pinching, misalignment, loose or tight bearings.



"FLOATERS"

FOR LONGER WHEEL LIFE

We believe our own special mixture of iron and exclusive heat treatment are responsible for making "Floaters" famous for their toughness and long wear . . . such quality is your assurance of perfect satisfaction.



Try S-D "Floaters". Check their savings. Experience proves that once an operator knows what "Floaters" will do for him, he specifies smooth-running "Floaters" for all wheel replacements. For complete information, write Sanford-Day Iron Works, Knoxville, Tenn.

SANFORD-DAY IRON WORKS

GENERAL

COMBINES SAFETY AND STRENGTH, EXTRA TRACTION AND SPEED . . . WITH LONGER WEAR TO DO ANY JOB, ANYWHERE

FASTER! EASIER! AT MORE PROFIT!

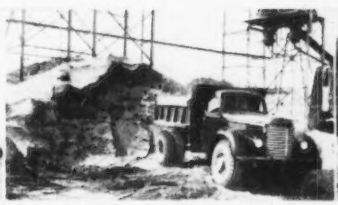
The General L. C. M. is built to do most work off-the-road, some on. Massive lugs of rubber dig deep for non-skid traction. Tremendous shoulders resist cuts, scrapes and bruises.

The General H. C. T. does most work on-the-road, some off. Thick, deep, free-rolling ribs give safety, speed and protection against punctures on the long over-the-road hauls.

THE GENERAL L.C.M.

THE GENERAL H.C.T.

In soft, slushy ground the General L. C. M. bites in for extra traction, forward or backward. Broad lugs keep tires on top of soft surfaces.



General H. C. T. rolls safely over the highway to off-the-road delivery points, gives extra traction when you need it most.

Heavy loads require extra strength and stopping-power. The General H. C. T.'s extra deep tread works faster, lasts longer, runs and stops safer.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

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It's TOBIN BRONZE

IF you've done the job right, it's a good weld when you've made it with Tobin Bronze.* This famous ANACONDA Welding Rod has been proving that for decades.

There's an important principle behind this. It's the fact that the low temperatures required with bronze prevent internal stresses from building up. This minimizes the danger of warping or cracking. And when you finish the weld, you get the bonus of bronze's easy machinability.

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Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

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All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

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Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

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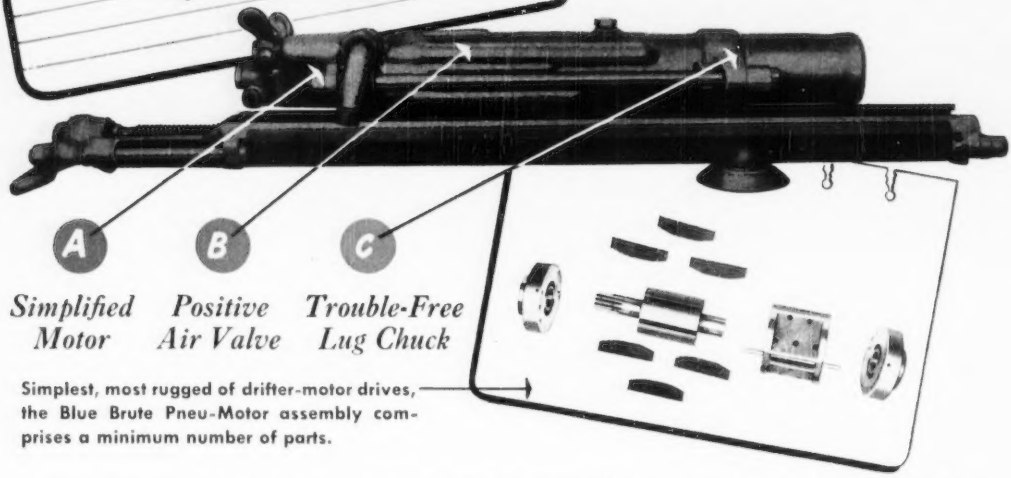
The "A·B·C" of Faster, Lower Cost Drilling

Only **BLUE BRUTE** *Drifters Offer You This Performance-Boosting Construction at Three Key Points!*



Simplified Motor *Positive Air Valve* *Trouble-Free Lug Chuck*

Simplest, most rugged of drifter-motor drives, the Blue Brute Pneu-Motor assembly comprises a minimum number of parts.

Motor, valve and lug chuck — when these three drifter elements pull together smoothly, you're on your way to yardage records! And in Blue Brute Drifters you can count on these key features for non-stop dependability on the toughest jobs you'll ever meet up with. Here's why:

(A) Pneu-Motor . . . Not "adapted" from some other air equipment, but especially designed for Blue Brutes, the Worthington Pneu-Motor is a standout for ruggedness — and the simplest drifter motor made. Parts are larger and fewer, assuring top wear resistance and freedom from work-halting breakdowns.

(B) Valve Assembly . . . A famous Worthington "exclusive" that has won the tribute of being copied. But for checking wear and reducing air consumption, no other valve — copy or not — has ever equalled the positive acting, end seating Blue Brute valve.

(C) Lug Chuck . . . In Blue Brute Drifters the one-piece chuck sleeve reduces friction, holds alignment better, allows the piston to hit cleaner and harder. Worth considering when you remember that the chuck area is a major trouble spot in ordinary drifter design.

Continuing the Blue Brute feature story, there's the scientific balance . . . the freedom from vibration . . . and the short-stroking under heavy loads that reduces the stuck steel nuisance — all of which speed up drilling cycles, cut operating costs and keep operators happy.

Why not let *your* miners try Worthington Drifters — the WPM (Pneu-Motor on drifter), the WPMS (Pneu-Motor on shell) or the WHC (Hand Crank)? Meanwhile, for further facts proving *there's more worth in a Blue Brute*, write for literature on the complete line.

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Semi-Portable Compressors. Drifters with Feed Motor Incorporated. Drifters with Feed Motor on Shell. Hand-Crank Drifters. Stopers. Hand-Held Rock Drills.

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Worthington Pump and Machinery Corporation
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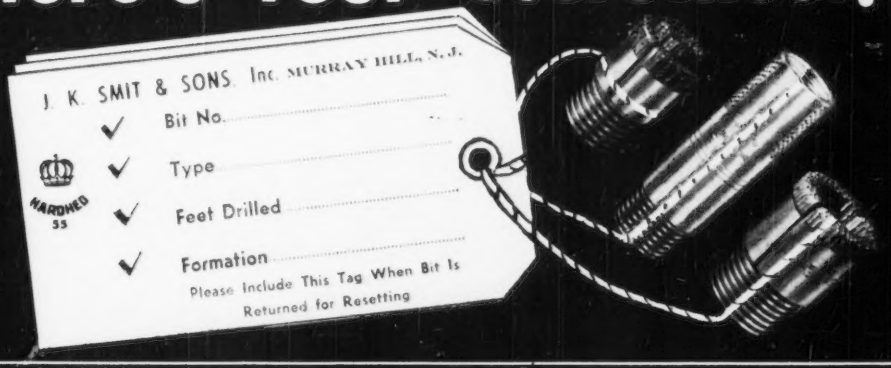
J. K. SMIT & SONS, Inc. MURRAY HILL, N. J.
Bit No.
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Formation
Please Include This Tag When Bit Is Returned for Resetting

J. K. SMIT HARDHED AND HARDHED "55" DIAMOND BITS AND REAMING SHELLS

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Composed of a tungsten alloy matrix—recommended for drilling all types of ground, except extremely broken or abrasive formations. Designed for resetting.

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Composed of small diamond particles bonded in a special tungsten carbide matrix, and is recommended for drilling all formations, but particularly for extremely hard, fine-grained formations, such as massive quartz, quartzite, jasper and taconite where whole stone bits become dull after only a few feet of drilling. This bit is designed to be consumed without resetting.

These matrices have been developed and have proved most economical in their respective fields. They cover the complete range of all drilling conditions encountered. However, complete technical and engineering cooperation is available when desired.

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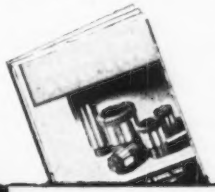
Score its performance in actual footage and formation data.

J. K. SMIT engineers then maintain and protect your initial investment with expert, personal attention to insure you the best possible drilling performance at greatest drilling economy.

J. K. SMIT drilling bits have a planned diamond distribution to hold gage, obtain evenly apportioned diamond wear, and to insure prolonged drilling life. The design of J. K. SMIT bits is the result of the most exhaustive tests and trials by the JKS Technical Staff. You will find the expert and higly functional design of JKS bits reflected in lowered drilling costs and high salvage returns.

In the JKS Research Laboratories both the finished bits and raw materials are studied, checked and controlled to insure continuous maintenance of the highest standards of quality. Every component must pass rigid individual tests for mechanical perfection; inside and outside diameters are carefully checked and such close tolerances maintained that bits of the same size can follow one another down the drill hole without preliminary reaming.

Write today for this FREE MANUAL and PERFORMANCE-SPECIFICATIONS



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Completes 300 TV sets— meets daily quota (at a cost of $4.70)

Delicate coils were needed by Midwest manufacturer to complete 300 TV sets . . . and Massachusetts supplier was 920 miles distant! Air Express assured delivery by 8 o'clock next morning, so manufacturer ordered 500 men to report for work. Shipment arrived 7:20 A.M.—production rolled! Shipping cost for 17-lb. carton only $4.70! Manufacturer uses Air Express regularly to keep business in high gear.

$4.70—and special pick-up and delivery included! Low Air Express rates cover door-to-door service. More convenient—easy to use. Just phone for pick-up! (Many low commodity rates in effect. Investigate.)

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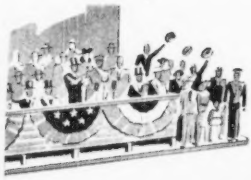
AIR EXPRESS GETS THERE FIRST

Rates include pick-up and delivery door to door in all principal towns and cities

A service of Railway Express Agency and the SCHEDULED AIRLINES of the U.S.



F–15A

HERE'S A

Parade

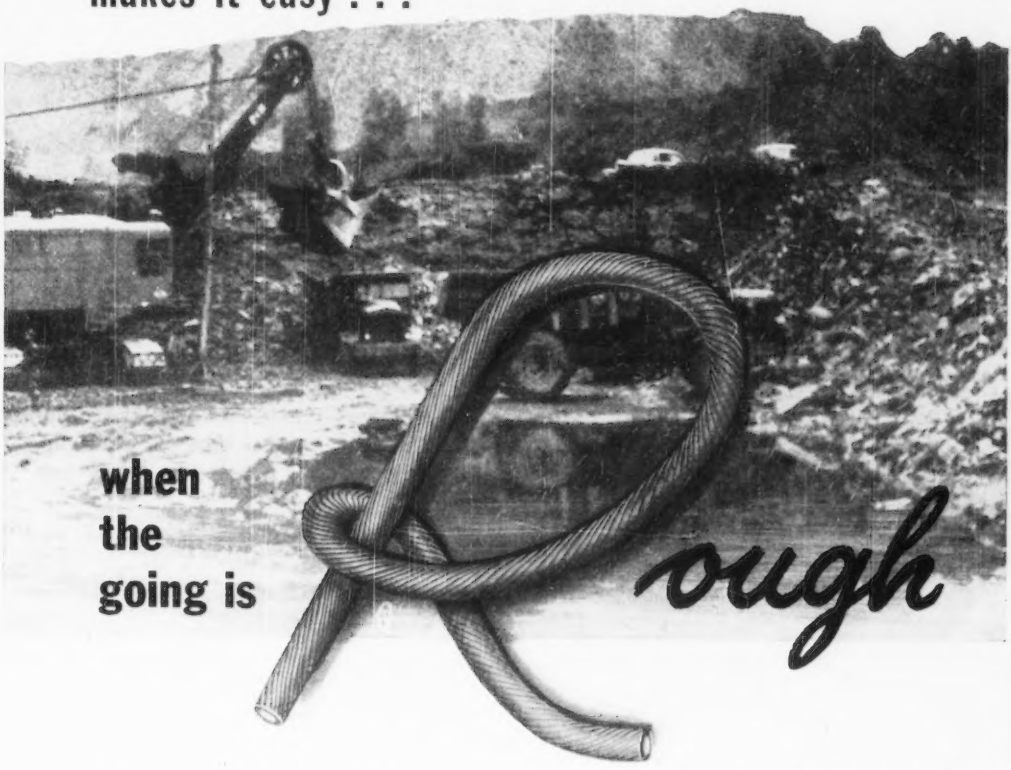
YOU WON'T WANT TO MISS...

Everybody loves a parade but here's one that's particularly interesting to YOU because it's packed with "pocket-book" appeal. It's a never-ending parade of products and services designed to help you do *your* job better, quicker and cheaper. You're in the "reviewing stand" for this parade because it comes to you in the advertising pages of every issue of this magazine. Alert manufacturers use these advertising pages to get the *news* about their products and services to *you* . . . quickly and effectively. To be well-informed about the latest developments in *your* industry . . . and to stay well-informed . . . *read all the ads too.*

McGRAW-HILL PUBLICATIONS

WIRE COUNTERED PRIMACORD

makes it easy . . .



WIRE COUNTERED PRIMACORD is *armored* with closely stranded brass wire. This wire countering has 2 important advantages:

1. The wires increase the *tensile* strength of the Primacord.
2. The wires *resist abrasion*; protect the Primacord during loading operations, or when it is used in ragged holes.

For these reasons Wire Countered Primacord is favored when the going gets rough. It is recommended for use as down lines in deep or ragged holes. Hook up to the main line with a simple half-hitch — it is not necessary to strip the wires to secure positive detonation.

There is a grade of Primacord to meet every blasting condition: Plain, Reinforced, Wire Countered and Plastic Covered. Each is flexible, easily handled from spools containing 500 and 1,000 feet each; waterproof, and insensitive to stray electrical currents.

Ask your explosive supplier, or write to The Ensign-Bickford Company, Simsbury, Conn.

Wire Countered

PRIMACORD-BICKFORD Detonating .Fuse.

LIMA RUGGEDNESS and DEPENDABILITY make GREATER PROFITS possible

● The narrower your margin of profit, the more important to you that your equipment be designed and built for maximum output and continuous, dependable, trouble-free service.

That's why LIMA Shovels, Cranes and Draglines are ideal for quarry and open-pit mining operations. Simplicity of design means fewer parts to get out of order. Important bearings are anti-friction type. Large drums increase output and minimize cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. Large clutches and brakes reduce lining wear. Extra rugged machinery base, truck and front-end equipment provide ample strength for heavy, punishing service.

These are only a few of the reasons why LIMA machines are your best investment when profits depend upon low operating and production costs.

The LIMA line includes Shovels ¾ to 6 yards, Cranes to 110 tons, and Draglines variable. Rubber-mounted truck cranes in 20 and 35 ton capacities

Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.*

LIMA HAMILTON CORPORATION

"Diversified stocks"... that's only one of the things we mean by Service Plus!

BARS · PLATES · FLOOR PLATE
STRUCTURALS · SHEETS
STRIP · REINFORCING BARS
▲
STAINLESS
ALLOY STEELS
ALUMINUM
▲
TOOLS · EQUIPMENT
MACHINERY

● Many of our customers think of United States Steel Supply as the "department store" of the steel industry. That's exactly what we aim to be . . . a source of supply that carries a diversified stock of steel, aluminum, tools, equipment and machinery so that customers' requirements can be met. Customers who have shopped around come back to us with comments like these: "Only place we could find what we wanted." "We were hunting an odd size . . . *you had it!*"

You can depend on us for more than diversified stocks, however. *Service Plus* means prompt delivery, and instant, courteous attention to any problems you have involving material selection. It means *You're the Boss* and we're going to do our best to keep you satisfied.

WHEN YOU DEAL WITH US, YOU GET Service Plus!

UNITED STATES STEEL SUPPLY COMPANY

USS TRADE MARK

Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO
CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH
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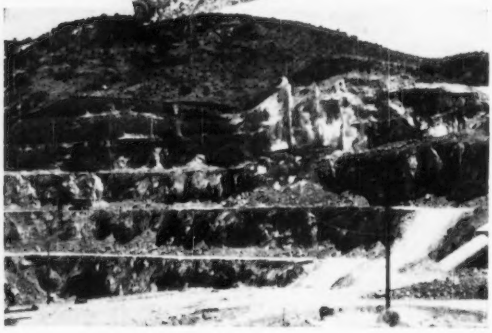
Sales Offices: INDIANAPOLIS · KANSAS CITY, MO. · PHILADELPHIA · ROCKFORD, ILL. · TOLEDO
TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

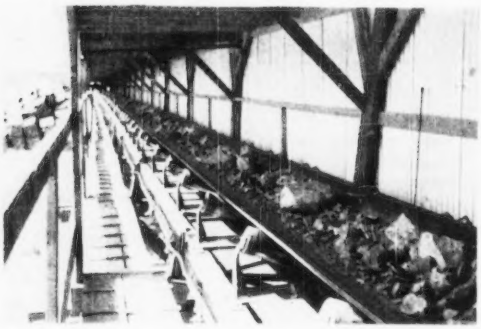
NYLON MAKES NEW BELT UP TO 250% STRONGER

Also provides more flexibility . . . easier training . . . carries heavier tonnage . . . is easier to repair

HERE A 2,300 FOOT cotton-nylon belt system is moving more than 700 tons of ore per hour. Use of nylon in combination with cotton yarns makes possible a greater number of fabric plies which increases overall belt strength by as much as 250 per cent.



THE SERVICE REQUIRED of conveyor beltings in this mining region demands a thick belt with great elasticity and high abrasion resistance. Despite its thickness this "U. S." Belt has greater flexibility, to conform more easily to path and contour of idler pulleys. This increases tonnage, reduces spillage.



KNOWN AS STYLE YN, this belt has been specially designed to accelerate the ever-expanding scope of mechanization, making possible longer centers and higher lifts resulting in ever-increasing economies. Its speed and facility of repairs this belt is unequaled in its class.

If you have any problem involving conveyor belting, talk it over with our engineers. They will gladly work with your own men in advising, planning or executing any job. Write Mechanical Goods Division, U. S. Rubber Company, Rockefeller Center, New York 20, N. Y.

A DEVELOPMENT OF

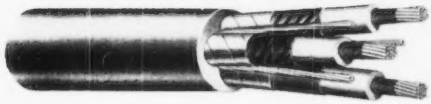
U.S.RUBBER

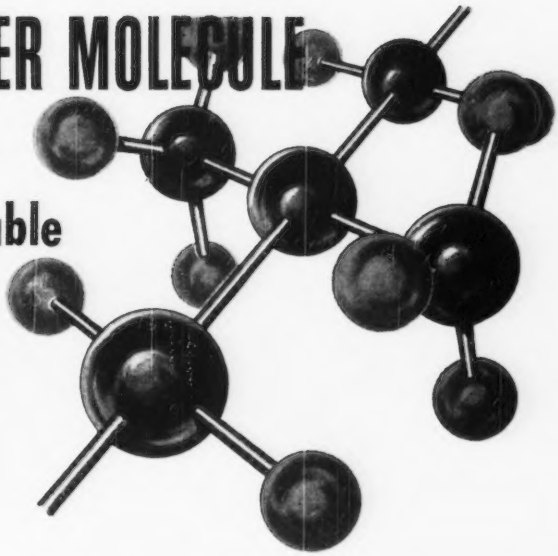
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.

This MADE-TO-ORDER MOLECULE means longer service for G-E mine power cable





Billions upon billions of these man-made butyl molecules form the basic ingredient of the insulation of General Electric Super Coronol mine power cable—molecules custom-built to assure extra-long cable life even under the most difficult operating conditions. This insulation—actually an improvement on nature—permits Super Coronol cable to offer all these advantages:

OZONE-RESISTANT. Super Coronol cable is ideal for high-voltage installation—to 15,000 volts—wherever there is danger of corona and resulting ozone.

MOISTURE-RESISTANT. Use Super Coronol in conduits, ducts, or directly buried.

HEAT-RESISTANT. Super Coronol mine power cable provides efficient operation up to 80 C.

HIGHLY FLEXIBLE. Even at extremely low temperatures Super Coronol flexes easily.

EXTREMELY STABLE. Super Coronol is highly resistant to oxidation and aging, and to acids, alkalies, and sunlight as well.

LIGHTWEIGHT. In medium-depth borehole installations, Super Coronol cable may be directly suspended by the conductors.

ELECTRICALLY PROTECTED. The conductors in Super Coronol mine power cable are covered with a metallic shield to drain off induced potential charges; ground wires provide a low-resistance ground-return circuit.

MECHANICALLY PROTECTED. Jacketed with tough, smooth Geoprene, Super Coronol cables take abrasion in stride, may be re-used in other locations as requirements change.

Cable replacement costs go down in a hurry when you specify General Electric Super Coronol cables. You can't afford to ignore these savings. For further information, consult your local G-E Construction Materials Distributor or cable specialist. Section W22-1295, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

COMPARE—and be convinced!

These figures, comparing Super Coronol insulation with ASTM and IPCEA requirements, show conclusively the superior physical and electrical properties of this cable.

PHYSICAL PROPERTIES

	IPCEA AND ASTM REQUIREMENTS	SUPER CORONOL (Typical Values)
Original		
Tensile strength, lb. sq. in.	450	750
Per cent elongation	250	600
Set in 2-in. test piece in.	$\frac{1}{2}$	$\frac{1}{8}$
After 7 days in geer oven at 70 C		
Tensile strength, lb. sq. in.	400	700
Per cent elongation	200	525
After 48 hours in oxygen bomb at 70 C		
Tensile strength, lb. sq. in.	400	675
Per cent elongation	200	525
Cold bend	—10 C	—10 C†
Ozone resistance	3 hours	excellent††

ELECTRICAL CHARACTERISTICS

Insulation resistance		
K value	5280	15000 and up
Power factor, per cent	5	1

†Can be installed at temperatures down to —40C

††Many samples have shown no signs of deprecriation after 72 hours' exposure.

Look to G-E wire and cable for continuing progress toward
MORE TONS PER MACHINE PER DAY
Investigate these famous G-E cables for better returns in mining operations:
Super Coronol* mine power cable . . . Versatol*-Geoprene cable . . . Geoprene portable cable . . . Bare hole cable . . . Varnished cambric cable . . . Locomotive cable . . . Flamenol* mine telephone cable . . . Shot firing cord . . . Deltabeston* cable and magnet wire.
*Registered Trade Mark of General Electric Company

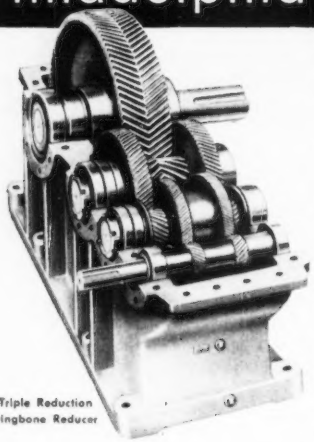
You can put your confidence in—

GENERAL ELECTRIC

THEY MEET THE CHALLENGE..

..OF HEAVY DUTY AND OVERHUNG LOADS

Philadelphia Herringbone Reducers



A Triple Reduction Herringbone Reducer

These types LX Herringbone Reducers driving a Tension Reel made by Steel Equipment Company (reduction ratio 10 to 1) are typical examples of heavy duty overhung load applications. Philadelphia Herringbone Units are constructed in two types—T type for standard overhung loads and X type for heavy overhung loads and in three general classes, namely; single, double and triple reduction types, determined by the number of gear trains used. Each type covers a wide range of sizes and ratios. From this complete line practically any equipment can be provided with the right operating speed, as standard ratios range from 1.75 to 1 up to 320 to 1.

Helical and herringbone type gears give high capacity and efficiencies with smooth tooth action. Efficiencies up to 98% are obtained. These units are also suited for speed increasing.

Other outstanding features of these units are explained in our catalog H-49. Write for a copy on your business letterhead.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

THE NEW NAME TO RELY ON FOR Safe, Sure Shot Firing Cord...

HAZARD REDSHOT* TYPE RG

*Hazard Redshot is the only shot firing cord made in the easy-to-separate, round, parallel form.

Cross section Actual size

Examine it in every detail and you'll find Hazard Redshot has everything you need and want in shot firing cord. It's service-designed and precision manufactured especially for safe, sure blasting in coal mining operations.

Insulation and sheath are combined in one single compound—tough, strong Hazaprene—proved beyond question for its durability in severe service. A uniformly thick, double wall of Hazaprene separates the parallel laid conductors, prevents shorting. This Hazard construction eliminates fibrous fillers which can absorb and retain damaging moisture...reduces conductor resistance...prevents "kinking" of cord in use...provides extra flexibility for easy coiling and uncoiling.

You'll also like the bright red color of Redshot which makes it highly visible; the grooved insulation for easy separation at connections; the quick way it strips clean for easy splicing. Hazard Redshot Type RG Shot Firing Cord fully meets the flame-resistant requirements of U. S. Bureau of Mines and Pennsylvania Department of Mines. For free sample of new Hazard Shot Firing Cord, mail the coupon below today. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD INSULATED WIRE WORKS
Wilkes-Barre, Pa.

Gentlemen:

Please send me a free sample of the new Hazard Redshot Type RG Shot Firing Cord.

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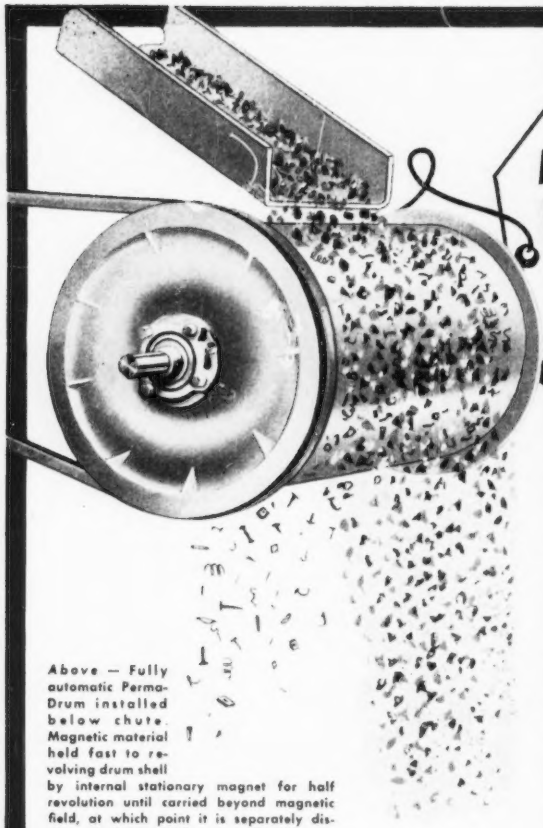
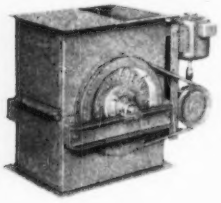
HAZARD insulated wires and cables for every mining use

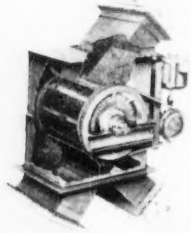


A Powerful New NON-ELECTRIC MAGNETIC DRUM for the Mining Industry

Above — Fully automatic Perma-Drum installed below chute. Magnetic material held fast to revolving drum shell by internal stationary magnet for half revolution until carried beyond magnetic field, at which point it is separately discharged. Magnetics flow over drum in normal trajectory.



Left — Fully enclosed dust-tight drum type separator for installation at foot of chute or in duct work.



Left — Fully enclosed drum type separator with inlet spout and separate discharge spouts for magnetics and non-magnetics. Ideal for fully dust-tight installations.

The Dings PERMA-DRUM® Reduces Separation Costs

HERE is an outstanding new line of magnetic drum separators that offer advantages heretofore not available in this type of equipment. These drums incorporate many improvements over the old electromagnetic drums with which you might be familiar. Here are a few of the Dings Perma-Drum features: • Non-Electric, Self-Energized, Permanent Alnico Magnet—No Electrical Installation or Maintenance, No Current Consumption. • Magnetic Permanence Guaranteed Forever—Unconditionally. • Abrasion-Resistant Drum Shell Made of Armor Plate for Extreme Wear Resistance and Exceptionally Long Life. • Not Affected by Weather Conditions—Heat and Cold or Water. Withstands Temperatures Up to 600° F. • Extremely Powerful—Tremendous Surface Strength and Greater Magnetic Separating Power than Electro-Drums.

For purification, concentration or tramp iron removal, investigate the Dings Perma-Drum.

DINGS MAGNETIC SEPARATOR COMPANY

4716 W. Electric Ave., Milwaukee 46, Wisconsin

WRITE FOR CATALOG

New Perma-Drum Catalog gives complete data on construction, sizes, capacities, etc. Includes typical installation diagrams. Free on request.

DINGS *Certified* MAGNETIC STRENGTH

YOU WON'T SAY "DANG IT" IF YOU "DING" IT

UNOBA SIMPLIFIES LUBRICATION

Mine operators save time and money with the multi-purpose grease that resists both heat and water

Multi-purpose UNOBA grease has *proved* itself with mining and mill superintendents operating under the most *critical* conditions. For example, one mill superintendent now uses heavy UNOBA exclusively on an 18" x 36" Type-H Traylor jaw crusher.

This company* formerly used brick grease but couldn't regulate the amount used. However, with multi-purpose UNOBA any desired amount can now be fed by increasing the depth of the grease over the bearing . . . reducing wear to a minimum.

**Name available upon request.*

Just what is UNOBA? Union Oil's exclusive UNOBA is a *barium* base grease that resists *both* heat and water. It sticks to metal surfaces with a tenacity that boiling water can't break! And it gives thorough protection at temperatures from below freezing to over 300° F.

Because of this flexibility, UNOBA *simplifies* lubrication. It performs on jobs formerly requiring *many* different types, grades and brands of grease. This results in reduced inventories, smaller storage space, less chance of using the wrong lubricant and lower maintenance costs to you.

For *full* information, call your local Union Oil Representative, or write Sales Department, Union Oil Company, Los Angeles 17, California.

76 UNION OIL COMPANY OF CALIFORNIA

FREE

From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C-103.

28 PAGES
of helpful facts to know about
COTTRELL
ELECTRICAL PRECIPITATORS

Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as . . .

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

. . . and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING...

...in all parts of the U.S.A. and foreign countries.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

At Mary Ellen Mine — heavy media plant in building at left; conveyor on right delivers ore from crushing plant in pit *(see picture below)* where Telsmith Gyraspheres do fine crushing.

crushing

BANDED TACONITE with

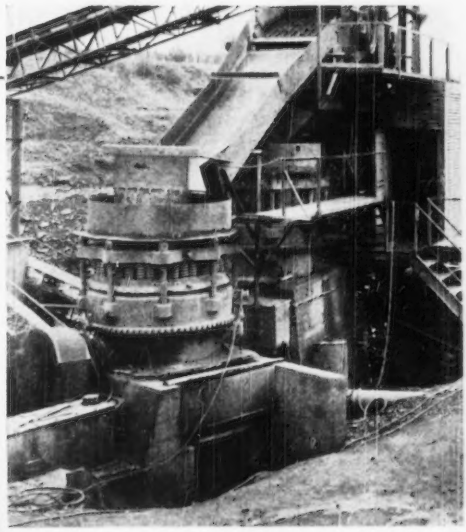
TELSMITH

Gyraspheres

ON THE MESABI IRON RANGE

On the Mesabi Iron Range of Minnesota, the Stanley Mining Co., Biwabik, Minn., is mining and treating banded taconite. Here their Mary Ellen Mine has two Telsmith Gyraspheres (shown at the right) which have, for the past two years, been doing a right good job of fine crushing for the mill feed. Plus 2-in. material passes to one No. 48 Telsmith Gyrasphere, with coarse crushing concave bowl, set at 1-in., and in closed circuit with a screen. Minus 2-in. plus $\frac{3}{4}$-in. oversize from the screen's bottom deck passes to a second No. 48 Telsmith fine concave Gyrasphere, set at $\frac{5}{8}$-in., and thence to the beneficiation plant.

The *new* Telsmith heavier design Gyraspheres have a longer crushing stroke for greater capacity and a finer, more uniform product and new mechanical features for lower up-keep and longer life, resulting in lower crushing cost per ton.



Min-32

Get New Bulletin 274

describing all the new design and mechanical improvements of Style S Standard and Style FC Fine Crushing Gyraspheres.

SMITH ENGINEERING WORKS, 502 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

Samuel Osborn (S. A.) Ltd., Johannesburg, So. Africa — Armco International Corp., Buenos Aires, Argentina — 51 East 42nd St., New York 17, N. Y. — 211 W. Wacker Dr., Chicago 6, Ill. — Mine & Smelter Supply Co., Denver 17, Colo. — **Mines** Eng. & Eqpt. Co., San Francisco 4, Calif. — Mussens Canada Ltd., Montreal, P. Q. — Gordon Russell, Ltd., Vancouver, B. C.

The world's fullest market basket naturally takes the shape of America. For that fact thank *industry* – steel mills and textile mills, paper mills and oil wells, machine tool plants and tractor plants, every place where wheels turn and men work. Wheels turn faster and men work more efficiently in *every* industry because of anti-friction bearings. And every industry knows and uses SKF Ball and Roller Bearings. Every industry knows SKF as pioneers. Every industry knows that SKF engineering anticipates their needs for exactly the right bearing to do the job at hand. **SKF** INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep-Groove Ball Bearing, Spherical Roller Bearing, Self-Aligning Ball Bearing.*

7031

HELPING MAP OUT *America's*
276-BILLION DOLLAR MARKET BASKET

More and More

Cummins® Diesels

More Cummins Diesels are being delivered in new heavy-duty highway trucks using engines of 150 h.p. and over than any other make of engine—**gasoline or Diesel!**

And more 200 h.p. model NH-600 Cummins Diesels are being delivered in new heavy-duty highway trucks than any other engine—**gasoline or Diesel!**

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

EXPORT: CUMMINS DIESEL EXPORT CORPORATION, COLUMBUS, INDIANA, U.S.A.—CABLE: CUMDIEX

Diesel power by **CUMMINS**

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors earthmovers • shovels • cranes • industrial locomotives air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units work boats and pleasure craft.

Here's Why it Pays You to Read the Advertising

The advertising is a rich source of valuable information. In this magazine it offers you ideas and products that may well apply advantageously to your business.

Every issue is a catalog of goods, materials, and services – quickly available to you – just for the reading.

Leaders in business and industry turn to the advertising because they've discovered it helps them run their businesses more profitably.

When you read all the ads in this magazine, the chances are good that you'll get a lead that will materially help you do a better job. For example, you may find a specific piece of equipment that will be a profitable time-saver. Or a tool that will increase worker efficiency. That's why it pays to read the advertising. It's good business.

McGRAW-HILL
publications

F-20

HELPFUL FACTS ABOUT flotation IN THIS 16-PAGE BOOKLET

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Pulp Density 4
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Cellulosics as Depressants, Flocculators, and Dispersers 6
Appendix 6

This new technical booklet, "Flotation and Hercules Flotation Agents," is designed for mining and metallurgical engineers, and for all others who are alert to the economic potentialities of ore beneficiation.

Included in the 16-page booklet are descriptions of the flotation process and the functions of flotation agents, as well as information about Hercules' frothers, collectors, and modifiers. A special section of mathematical formulas useful in flotation is of added practical value.

Write for your copy today.

HERCULES POWDER COMPANY 922 King Street, Wilmington, Delaware

RMSO-1

Important FACTS ABOUT pH for MINING & MILL OPERATORS

WHETHER you are building a new plant or modernizing present equipment, one of the most important advancements you can make in your mill operations is the installation of BECKMAN pH CONTROL. Throughout the mining industry—in gold, tin, tungsten, lead, zinc, copper and many other flotation operations—Beckman pH Control is proving to be the key to much higher recoveries, better control of processes, lower labor and chemical costs. Result—substantially greater profits per ton of ore. Some of the many benefits resulting from Beckman pH Control include . . .

. . . greater speed, convenience and accuracy in laboratory leaching or flotation tests.
. . . opportunity for centralized, or automatic, control of multiple flotation circuits.
. . . reduction of corrosion and scaling in mine pipe lines.
. . . improved, or automatic, control of electrolytic operations.
. . . *and many other vital savings in mining and mill operations—savings that will quickly pay for the installation, and will continue producing extra profits throughout the years!*

▶ BUT TO MAKE CERTAIN you get the latest, most convenient and most accurate pH equipment available, be sure to specify "BECKMAN"...

✻ Beckman pH equipment is completely electrometric, eliminating the mess and inaccuracies of colorimetric methods. Simply press a button and the exact pH of any process is instantly shown on a large easily-read dial. *It is the simplest of all pH methods!*

✻ The accuracy of Beckman pH readings is completely unaffected by human errors in color judgment, by turbidity, oxidizing or reducing agents, by suspended materials, colored process solutions or other variables that affect outmoded colorimetric methods. *Beckman pH readings are universally accurate and dependable!*

✻ With Beckman equipment no time-wasting or troublesome sampling devices are needed. Beckman pH electrodes may be installed directly in vats, tanks, channels or flow lines—and exact pH values read instantly—and continuously, if desired—on the process fluids themselves.

✻ Unique rugged-type Beckman Electrodes, specially designed for direct immersion in abrasive or suspension-laden fluids, reduce maintenance to an absolute minimum. *Beckman is the most trouble-free of all pH equipment!*

Helpful Bulletin! A Beckman Bulletin outlining interesting pH applications in the mining industry is available and will gladly be sent without obligation. Ask for pH data on mining applications.

THERE'S A BECKMAN pH INSTRUMENT FOR EVERY NEED

COMPLETELY AUTOMATIC! The Beckman Model R instrument operates directly from standard 110 v. A.C. lines to provide completely automatic pH indication. Also provides for completely automatic pH recording and automatic process control. Can be installed to give accurate pH readings from various stations in plant through one instrument. *This is the pH unit being installed by today's most modern plants, large and small.*

PORTABLE A C OPERATION! The Beckman Model H instrument can be quickly moved from one part of the plant to another and plugs directly into standard 110 v. 50/60 cycle A.C. current. Compact, convenient and extremely simple to operate, the Model H gives instant pH readings on an easily-read dial. It is widely used both for manual pH control of small plants and as an auxiliary instrument on completely automatic pH installations.

COMPLETELY SELF-CONTAINED! The Beckman Model M is the ideal pH instrument where *complete* portability is desired. Operating from its own self-contained, long-life power supply, the Model M can be used *anywhere* in the plant or field, whether convenient to power lines or not. Features the same accuracy, simplicity and operating speed as the Model H, and is also widely used both for manual pH control of small plants and as auxiliary equipment on large automatic installations.

Write for literature on Beckman pH Equipment!

BRING YOUR pH PROBLEM TO US. Our trained engineers will gladly study your problem and recommend the equipment best suited to your particular requirements. No obligation, of course.

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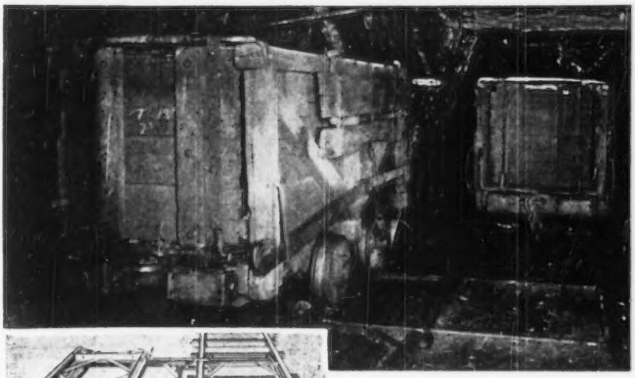

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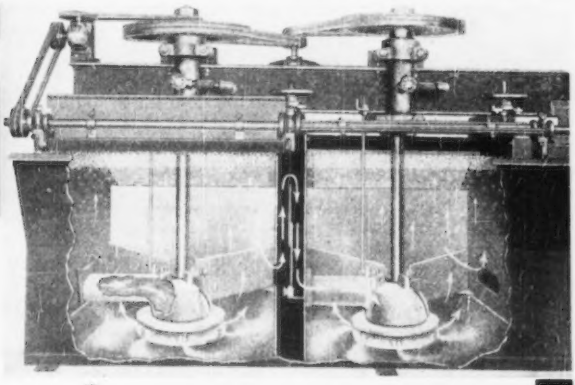

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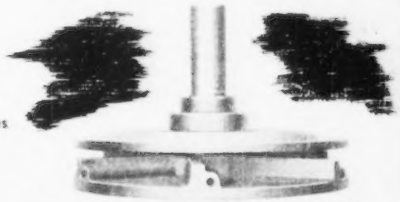

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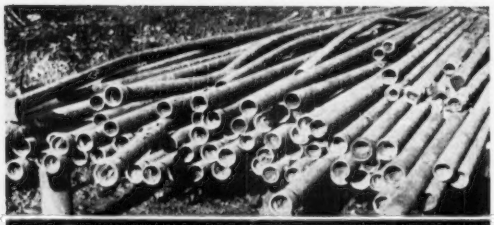

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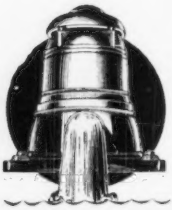

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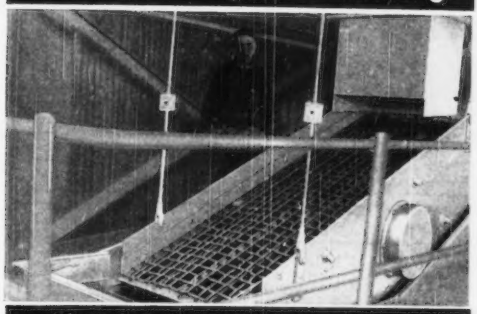

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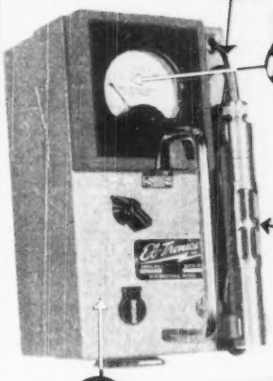

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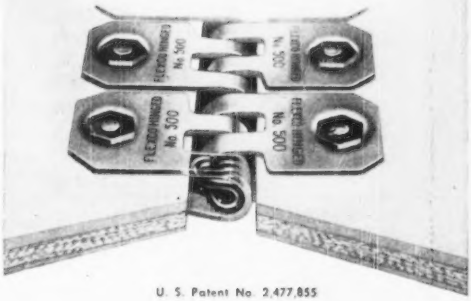

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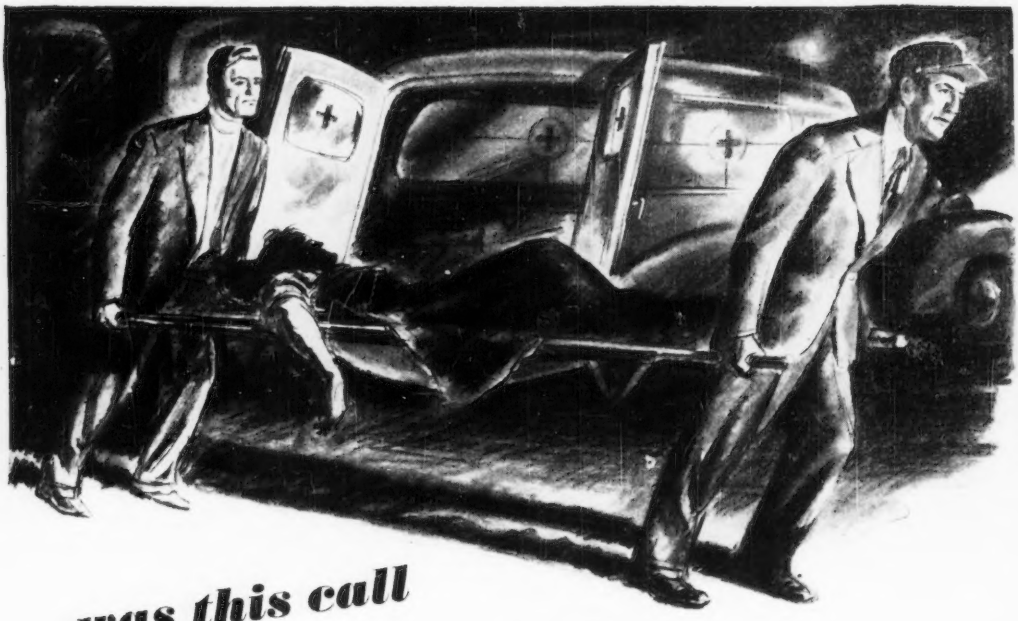

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- Storage of edible liquids
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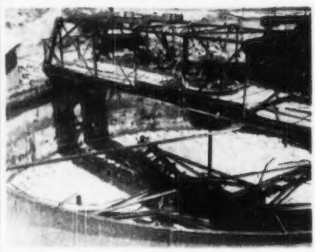

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November 22, 1950
DIVIDEND NO. 170

The Board of Directors of Anaconda Copper Mining Company has today declared a dividend of One Dollar and Fifty Cents ($1.50) per share on its capital stock of the par value of $50 per share, payable December 21, 1950, to stockholders of record at the close of business on December 1, 1950.

C. FARLE MORAN, Secretary & Treasurer.

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ONE 7 FOOT DORR duplex classifier, FH or FXDF, complete with motor, 440 volt, 3 phase, 60 cycles.

W 7830, Engineering & Mining Journal,
330 W. 42nd St., New York 18, N. Y.

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1—100 HP Single Drum Hoist.
1—527 CFM Gardner-Denver Compressor, 9¾" & 6" x 7", complete with 100 HP motor, drive and starting equipment.
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1—36' c to c 18" belt conveyor.
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1—32" Merrill-Crowe Precipitating Press, 16 triangular 2" frames.
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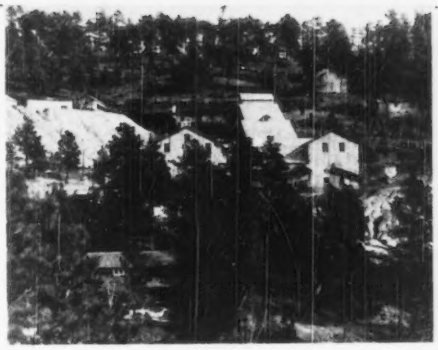

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20"	5	1/8"	1/32"	28 Oz.
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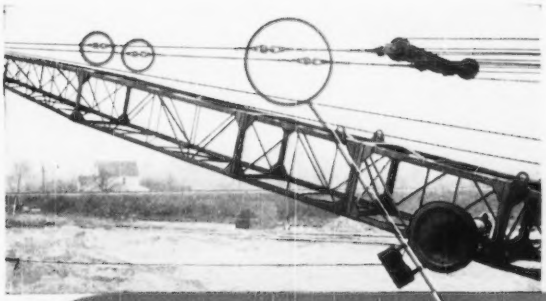

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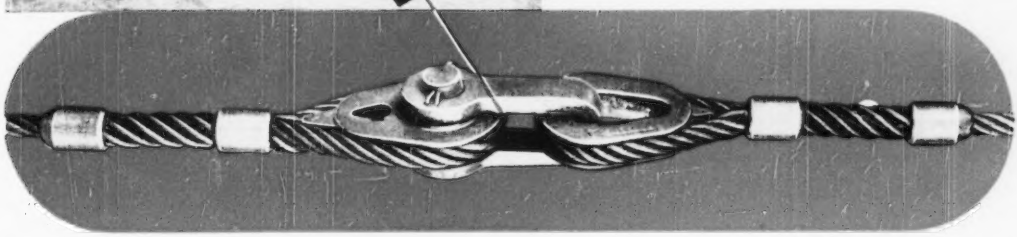

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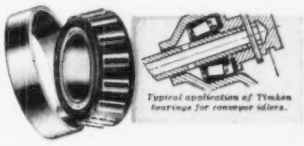

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